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THE BRICKBVILDER

OFFICE 85 WATER STREET BOSTON

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

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THE MANUFACTURER'S SIDE.

EDITORS OF THE BRICKBUILDER:—

Gentlemen,—Some notable articles have recently appeared in THE BRICKBUILDER on the subject of colored bricks. Written apparently by architects of high standing, they indicate an interest in this subject among the leaders of the profession which is very encouraging, and which is likely to bring about some interesting results. One of the most noticeable things about these articles is the unanimity with which they emphasize the importance of a refined taste in the use of colored bricks. "The loud and vulgar effects," which are, indeed, too common, are scathingly rebuked, and, while we cannot wonder at the expression of contempt for these, we must remember that every good thing has its vulgar imitators, whose bungling attempts to reach the (to them) unattainable only emphasize the beauties which rest upon the heights above them. "There is always room at the top," and the truly ambitious and able architect may rest assured that if he reaches the summit his efforts will be appreciated. Another opinion expressed in these articles is that the rough surface brick is preferable to the smooth where artistic effects are sought. This question of surface and texture is one of the most interesting connected with the manufacture and use of brick. Twenty-five years ago very few pressed brick were produced, the common rough red being the standard.

Among the first to introduce a brick of superior workmanship was the Peerless Brick Company, of Philadelphia. Their molded and pressed bricks soon became famous for fine fronts, and were shipped all over the country. The demand was so great that the Peerless Company could not meet it, and other factories were established, and pressed red bricks came into general use. The bricks were of good workmanship and were made by the "soft-mud" or "water-tempered" process. They were pressed in hand presses. Then came the invention of power presses, and, as these were improved, it was discovered that dry clay, when subjected to the enormous pressure obtainable by these presses, could be formed into bricks of most perfect outline, which could be passed direct from the press to the kiln. Mechanically, the dry pressed bricks are perfection. Being made of finely ground clay as it comes from the bank, without the water-tempering process, the particles composing the bricks are driven together by the enormous pressure of the steam press, forming sharp, clear-cut edges, as perfect as if carved in wood or cast in metal. With this perfection of form, however, naturally goes a perfection or imperfection, as the opinion may be, of surface and texture. No discussion is intended here of the comparative merits of the water-tempered and dry pressed bricks, and no reflection is intended upon the latter when I say that they are too smooth in appearance to suit the taste of such architects as the writers in THE BRICKBUILDER before mentioned. It is fortunate that all tastes are not alike, or we should not have that variety which is so truly the "spice of life."

But there are extremes in both directions; the "rain washed," the "pimpley," and the "twisted" bricks are the extremes in the direction of rough surfaces.

While such, doubtless, have their uses, they are quite liable to be misused; for instance, a misuse of rough bricks has been made in the Boston Public Library, where, in one of the reading-rooms, the roughest kind of red bricks, devoid of merit, even in the direction of color, are exposed to view. One cannot help thinking what a fine effect could have been obtained by the use of water-tempered, hard-burned brick, of a soft russet color. In connection with this subject of interior brick, I note the remark of one of the writers, that it would prove a great boon if large-sized bricks of [illegible] of the present fine and numerous colors could be produced for the interior of churches. I would like to remark right here that such bricks and blocks can be produced, and the time is at hand when they will be, in such variety and beauty of color, such excellent workmanship, and, at the same time, at such moderate cost that their use, not only in churches, but in other public buildings, will become very extensive.

The above is my prophecy; "watch out" and see how soon it will be realized. But, as to color, there is one point of considerable importance which I note has not been touched upon by THE BRICKBUILDER writers, namely, the question of the color of mortar used with colored bricks. The importance of this factor cannot be over-estimated.

You may take the same bricks, and build one front with red mortar, another with black, and another with white, and at a distance of, say, 200 yards or more a novice would most surely declare that the bricks were of a different color. There is a public building now being erected in Rhode Island, where the architect had planned to use different shades of bricks in the different stories, in order to obtain a certain color effect, but has now decided to simply use different colored mortar with the same bricks. The result will be watched with interest.

The manufacture of high-class, architectural clay products, although it has received a great impetus within the past fifteen to twenty years, is susceptible of still more remarkable development. Men of brains, of educated and well-trained brains, are giving it the best effort of their lives. Architects of high standing and ability are devoting much personal attention and study to it, and the results are likely to be surprising, especially in the direction of machine-made clay products of great range of form and color, and of very moderate cost.

A few days ago two builders were discussing this matter, and they were both agreed that a few years ago they were not troubled with this color question; a brick house was a *red* brick house, as a matter of course, but now, they said, "we must spend days in studying this question, comparing this color with that, and the more we study it, the more puzzled we are." This is doubtless true, but it is also true (in spite of its misuse) that the introduction of color into our architectural clay products has wonderfully beautified the architectural features of our cities, and has opened new avenues of attainment to our aspiring architects.

GEO. M. FISKE.

WITH the prospect before the people of Boston of having to use for many years the subway now in progress of construction, we feel it is not amiss to urge emphatically the use of such materials in the finishing construction of the same as shall materially add to its beauty while contributing to its structural qualities. We believe that, in addition to simply meeting the absolute requirements of a mere tunnel for the purpose of facilitating transportation, the subway should be light, bright, well ventilated, and attractive. As the motive power will be electricity, there is not the question of smoke and gas with which to contend; thus, the interior of the tunnel once lined with a proper material, having the qualities named above, there is practically nothing which would mar its beauties by dirt and stain.

In seeking the material which shall combine these elements of being light, bright, and attractive we naturally turn to enameled bricks. They certainly have all these qualities and others as well, being tough under conditions of strain and pressure, retaining their surface against the action of heat and cold, and holding their brightness unchanged through the lapse of time. They are impervious to moisture, easily manipulated, can always be duplicated, and when their worth is compared to their cost they are not expensive.

It would seem from their growing popularity that their practicability in this capacity *is* well established. A handsome example of subway for ...estrians so finished may be seen at Allston, Mass., ...y which extends under the Boston & Albany Rail... Here a combination of white enameled bricks with ...colate-brown color for bordering is used.

... do not believe it is the aim of the commission to give us simply a trench as a means of rapid transit. On the contrary, our subway should combine utility and beauty as far as practicable, and when decision is finally made as to the interior finish enameled bricks should be the choice.

WE cannot at this time give the names of the gentlemen who will act as judges for the New York Architectural Terra-Cotta Company's Competition, as two of the gentlemen desired are at present in St. Louis, attending the convention; we shall, however, be able to announce the prize-winners, together with the judges' report, in the November number.

THE drawings submitted in the City House Competition, which were prepared for exhibiting in the different architectural clubs of the country, have scored a decided hit in those cities where they have been shown. They acted as THE BRICKBUILDER'S representative at the St. Louis Convention of the American Institute of Architects.

OUR ILLUSTRATED ADVERTISEMENTS.

THE subject of this month's illustration in the advertisement of the Hydraulic-Press Brick Company (see page xix), is the church of Santa Maria, in Transtevere, Rome. This church was built in 1139, portions of which have been restored at various epochs since.

On page xviii will be found an illustration of "The Bolkenhayen," on Fifth Avenue and 58th Street, New York. All above the first story is executed in brick and white terra-cotta, the latter having been supplied by the New York Architectural Terra-Cotta Company from designs by Mr. Alfred Zucker.

The adjoining plates show a portion of the quoins used up the main angles of the building and the motif in frieze over the triple windows on Fifth Avenue front. The diaper work on sixth story is laid up in small blocks, with a simple ornament in relief on face of each block, giving an effective variation to the wall surface.

The illustration in the advertisement of the Celadon Terra-Cotta Company, Charles T. Harris Lessee (see page vi), is the residence of the late Geo. H. Babcock, at Plainfield, N. J.

This design was treated in a very odd and picturesque manner. The exterior walls are built of selected, over-burned brick and accidents of terra-cotta and Philadelphia pressed brick, laid up at random, without regard to uniformity and with noses protruding. The roof is covered with a combination of the Celadon Terra-Cotta Company's Rhinocerous and Gothic Tiling, which produces an effect in harmony with the design. Mr. Babcock was president of the company and the inventor of these tiles, which are becoming favorably known among the prominent architects of this country.

The Clinton Metallic Paint Company have a fine half-tone illustration of the 71st Regiment Armory, 34th Street and Park Avenue, New York City, in their advertisement (see page xxiv). The large granite blocks used in the construction of this building were laid up in their Clinton Hematite Red Mortar Color.

THE following gentlemen have consented to act as judges for the William Connors Competition: Messrs. R. Clipston Sturgis, Bertram G. Goodhue, and David A. Gregg. The prize-winners and report of the judges will be published in our November number.

THE Sixth Annual Convention of the National Association of Commissioners and Inspectors of Buildings was held at Baltimore, October 15, 16, and 17. Among the subjects considered and upon which papers were submitted were, "How to Prevent the Spreading of Fires in Apartment Buildings and Flats," "Safety of Floors in Business and Public Buildings," "Probable Safety of Mill Construction as Compared with Brick, and Stone, and Ordinary Wood Buildings," "Strains as Applied to Wood, Steel, and Iron Construction," "Egress — School Buildings, Churches, Hospitals, Theaters, Factories, and Public Halls."

TERRA-COTTA TREASURES.

BARON ROTHSCHILD has purchased the beautiful collection of antique art treasures which has lately been discovered at Bosco Reale, and has presented them to the Louvre, where they will be on view in October next. The collection is formed of about forty pieces, which have been buried for more than eighteen centuries under the cinders and lava of Vesuvius, and have, therefore, of course, been much damaged. Bosco Reale is situated between Pompeii and Vesuvius, and was destroyed during the great eruption of Vesuvius, A. D. 79. Some owners of property there of the name of De Prisco, in making some excavations a short time ago, discovered the villa of a rich Roman patrician, and in this villa they found silver ornaments, glass candelabra, and amforæ. There are also lamps and "biberons" in terra-cotta, on the latter being beautiful reliefs. The most important object of the collection, and that which is at the same time the best preserved, is a large patera, 25 centimeters in diameter, which has a finely executed bust of Africa in relievo in the center in the form of a young girl, lightly clad, and with the proboscis and tusks of an elephant on her head. There are also some beautiful vases and tazze. It is said that it will require three months before the entire collection can be properly restored. — *British Clay Worker.*

GLAZED BRICK MAKING.

A NOTE OF WARNING.

THE improvement in trade, which has caused the demand for glazed and enameled bricks to increase very rapidly, has once again drawn the attention of brickmakers all over the country to this class of work, and it is well to issue a note of warning to all those who fail to see why they should not engage in this apparently very remunerative branch of the trade. We would first simply advise our readers not to be misled by laboratory experiments, or to think that because they may have succeeded, after a course of experiments, in producing a small piece of enameled ware that they have solved the whole question as far as relates to their particular clay. Unfortunately, there are, at the present time, a number of so-called glazed brick experts who take upon themselves a roving commission, and very often succeed in getting hold of an enterprising brickmaker who, by promises of what they can do, and even by samples produced in some mysterious manner in a back building at the works, is led on to spend time and money in following up this "will-o'-the-wisp." In a great many cases the sole object is to get a position in the works at a good salary until that position becomes slightly uncomfortable. Needless to remark, under these circumstances the experiments are found to take much more time than was at first anticipated, and we could cite cases where one and even two years have been frittered away, the result achieved being practically of no use as far as actual business is concerned, to say nothing of extensive monetary loss. Given a small quantity of clay, it is quite easy to treat it in such a manner as to produce a glazed face, apparently of good quality; but it is an entirely different matter to make glazed bricks in quantities and fit for the market. This is quite apparent to all who have in any way studied the subject. Take, for instance, our largest manufacturers, and ask them what is their experience. Is it not that thousands of pounds had to be sunk to accomplish the required result, even after splendid examples had been produced in the laboratory or in an experimental way? We do not wish here to go into the complex question of glazing, but would simply urge upon all who are contemplating a step in this direction that too much care cannot be taken, and that appearances are often most deceptive. — *British Clay Worker.*

"VITRIFIED PAVING BRICK" is the title of a valuable little book just published by T. A. Randall & Co., Indianapolis, from the pen of Prof. H. A. Wheeler, who has made a specialty of the study of clays. It is a very timely publication, in view of the active discussion on the subject of good roads, especially as it is devoted to a class of pavements that seems to have a great future in this country. Price, $1.

BRICK AND MARBLE IN THE MIDDLE AGES.

G. EDMUND STREET.

CHAPTER VIII. — *Continued.*

I HAVE already shown that there are repetitions of many of the subjects, but it is equally worth notice that the foliage which forms the framework for the subjects is also repeated. There are, I think, only four varieties in its arrangement. In the first the capitals are arranged very simply — in some cases rudely — with tufts of foliage or heads. The capitals numbered 2, 3, 6, 13, 16, 20, 23, 27, and 34 are examples of this. In the next, the foliage of the lower part grows up vertically, bending slightly out to support the sculptured subjects. These are generally the most graceful of all, and infinitely richer in effect than the first class. The capitals numbered 1, 7, 9, 12, 18, 24, 26, 28, 33, and 36 are examples of these. In the third class the foliage is generally marked by the same feeling, but it rises vertically to the angles and curls over under the subject; the nineteenth and twenty-fifth capitals are examples of this class. In the fourth class the foliage curves over downwards, both at the angles and under the subject. The neckings below the capitals are wrought on the shaft itself. They are sometimes molded, sometimes corded, and sometimes delicately carved with foliage; these last are by very much the more beautiful, and generally accompany the best wrought of the capitals, whilst the inferior capitals have, in all cases, the plainer necking.

The capitals in the upper arcade have not so much story as those below. They have generally a head on each side in the midst of foliage, and are square in plan, though the lower caps are octagonal — a few only have their names written over them; but on the ground story most of the capitals have, or have had, explanatory inscriptions. Some of the upper capitals close to the northwest angle are among the best. The curves of the foliage in the angles of the capitals are admirably wrought, and may be compared, to the damage of the latter, with some of the lower capitals in the sea-front. The upper range of capitals gradually deteriorates from the northwest angle as you go to the southeast. These last are really very bad, having rude gross carving of the human figure, and foliage feebly massed and treated; but the upper capital of the southwest angle, with the figures of the four winds, and the two or three capitals near it must be excepted from this remark, being superb in design and execution.

The remains of original work in the quadrangle are much less important. The arcade on the first floor remains, but none of its details are good, and on the east side it is a poor Renaissance copy of the other sides. The whole of the lower arcade has been destroyed or altered. But in the upper walls, which are faced with brick, some of the original windows remain; they are small, but of the same sort of detail and character as the larger windows in the outer walls.

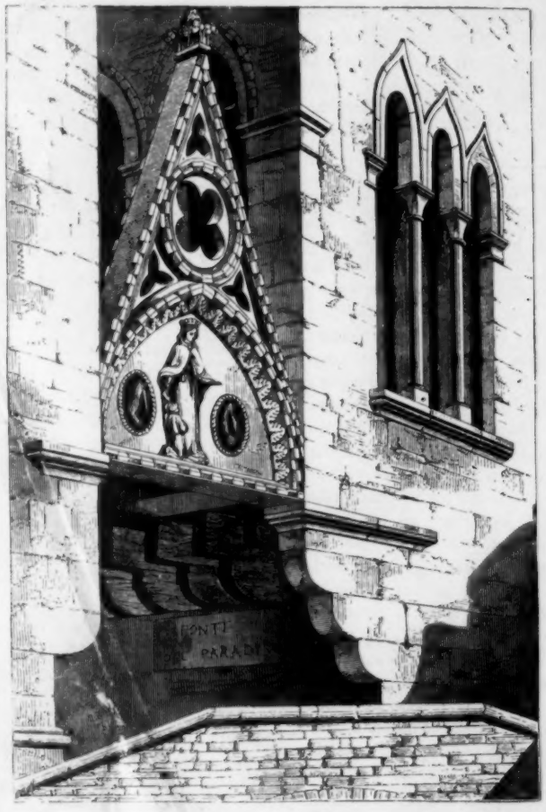
The building has lost much by the gradual raising of the pavement. This is now about 20 ins. above the old base of the columns, and their proportions are so far altered for the worse. And it has lost immensely, also, by the destruction of the inlaid marble which once filled all the spandels of the main arcade. Two panels only of these remain, and both in the sea-front. They are charmingly designed, enclosing circles which exactly touch the labels and strings.

Of the modern additions to this grand building I shall not say anything. They are not beautiful in themselves nor interesting by reason of their decorations, if I except those walls on which Tintoretto has lavished so much of his skill. The architects of the fourteenth and fifteenth centuries were artists in very deed, and it is with their work only that I can feel any real sympathy. Such,

then, is the Ducal Palace,— a building, certainly, in some respects, of almost unequaled beauty, but at the same time of unequal merit; its first and second stages quite perfect in their bold, nervous character and in the almost interminable succession of the same beautiful features in shaft, and arch, and tracery, forming, perhaps, one of the grandest proofs in the world of the exceeding value of perfect regularity and of a repetition of good features in architecture when it is possible to obtain it on a very large scale.

Leaving the piazzetta, and stepping into the gondola which has been waiting for us hard by, let us now go in search of other palaces; but let us not imagine that we are to see anything equal to the Ducal Palace. There is, it appears to me, a great gap between it and all other Venetian buildings; and yet all others seem to have been founded on it, or on the buildings out of which it grew. Their traceries, seldom absolutely alike, have still so much general similarity that at first one may well fancy that there is no variety at all; and, as I have before said, the general arrangement of their windows and doors is so nearly identical that this impression is the more likely to grow upon the mind.

We will not attempt to take the buildings as they come; but, rather, as we think of them, and to some extent in the order of their merit, let us note down a few of the glories of the domestic work of Venice. And first let us stop in this narrow canal, for we have by our side one of the most exquisite little pieces of detail in the whole city. It is an archway, simple and delicate in its proportions, lovely as it is simple, and appropriately placed hard by the bridge called "del Paradiso." I trust that my sketch is clear enough to show how pure and good the work is. The main points to be noted are the characteristic flatness of the details and the line of dentil-molding, which defines all the leading architectural features, originally invented for borders of incrustations at S. Mark's, and here, as everywhere in Venice, used for decoration afterwards. The incrusted circles of marble on each side of the figure give great life to the spandrel beneath the arch, and the windows seen behind show us a late example of the not unfrequent use of the semi-circular and ogee arches together in the same window.



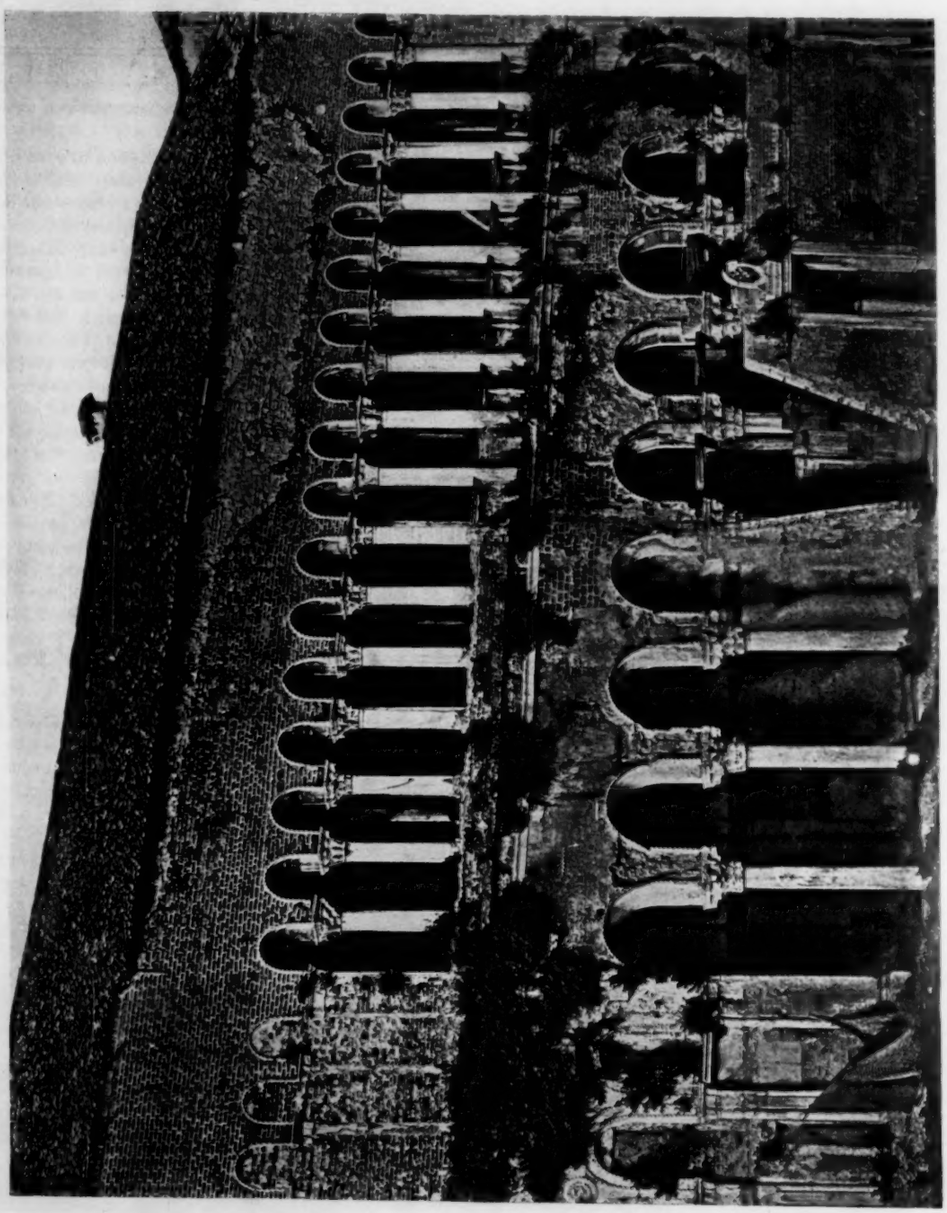
ARCHWAY, PONTE DEL PARADISO, VENICE.

Another precious fragment,— the Palazzo San. Giorgio, I believe,— is reached from the land side by passing under an arch somewhat similar to that on the Ponte del Paradiso. This arch is turned between the upper stories of two houses at the end of a *calle*, properly yclept "*dell' arco detto bon*," and is finished with a steep gable. Beyond it is seen a fragment of wall veneered with marble, with the upper part of an early two-light window, and two circular medallions, and above this a piece of wall veneered in diamonds of red and white marble, — so far as I know a unique example of such a treatment. The window-head is of that earliest form of ogee, a circle just turned up to a point in the center, which has so manifestly an Eastern origin, and which must not be confounded in date with our English ogee arches.

In another and rather desolate canal in the outskirts of the city, wider than usual, and with a footpath at the side of the water, instead of having the walls of the houses running down into it, and forming its boundary, is the Palazzo Cicogna, which I remember gratefully because it is one of the few exceptions to the general rule of regularity. The whole design of this building is very irregular; a detached shaft at one angle supports a portion of the house which overhangs and forms a sort of open passageway; to the right of this opening is a four-light shafted window, and then a plain wall pierced with two windows, each of a single ogee trefoiled light. The upper story has two single windows over the others, whilst over the larger windows and the passageway is a large window conspicuous from its size and the peculiarity of its tracery. It is of six lights, divided by very good shafts, and properly arched with pure and good trefoiled arches; above these and enclosed within the perpetual indented or billeted string-course is a complicated system of intersecting circles pierced at regular intervals with quaterfoils. The section of this upper part is very much thinner than that of the arches beneath. This window is in a most shaken and decayed state, and not likely, I fear, to be long preserved. The whole elevation is finished with a shallow cornice supported on corbels.

A doorway on the Ponte San Tomà is quite worthy of a visit. It has the usual square opening of reddish marble, and above this is a pointed arch of molded brick; the tympanum is filled in with a square carved center panel, and the ground beyond this with quartre-foils of brick or tile, very prettily disposed and quite deserving of illustration.

And now let us go back to the grand canal; we shall enter it by the side of the Palazzo Foscari, which, with two other contiguous palaces, occupies quite the post of honor at the bottom of the principal reach of the canal, and commands the whole view of its noble and ever-busy way to where the arch of the Rialto and another bend in the canal close in the view. We will go a few strokes only towards the Rialto, and then turn round to look at the palaces we have just passed. They certainly form a most magnificent group, and are in every way worthy of their conspicuous position. The palace at the junction of the two waters is that of the Foscari; the others belonged, I believe, to two of the Giustiniani family; and but a few yards up the canal, which runs by the side of the former, is one of the smaller remnants of Byzantine work already referred to. This group is so well known as scarcely to need any description; suffice it to say, therefore, that throughout these palaces the windows are shafted and the glass is fixed in wooden frames behind the stonework. This is beyond all doubt what we ought to do; it is the only sensible and rational mode of adapting the system of traceried and shafted windows for domestic purposes, and has here, as elsewhere, the prestige of ancient authority to recommend it to the consideration of those amongst us who will do nothing without it. I have enlarged on this point elsewhere, and will, therefore, say no

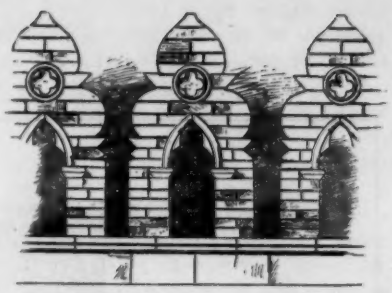


PALACE OF TURKISH AMBASSADORS.— BEFORE RESTORATION, VENICE, NOW THE CORRER MUSEUM OF VENETIAN ANTIQUITIES.
SUPPLEMENTARY ILLUSTRATION TO "BRICK AND MARBLE IN THE MIDDLE AGES."

more upon it now, save that in Venice such a thing as an English monial ordinarily is was never known. Windows were invariably shafted from the earliest period to the latest, and so far, invariably of the highest order, inasmuch as they admitted of the definite expression of the point at which the monial terminated and the arch commenced, and inasmuch, too, as the colored surface of the detached marble shaft must ever be far more lovely than the lines of tracery moldings carried down even to the sill.

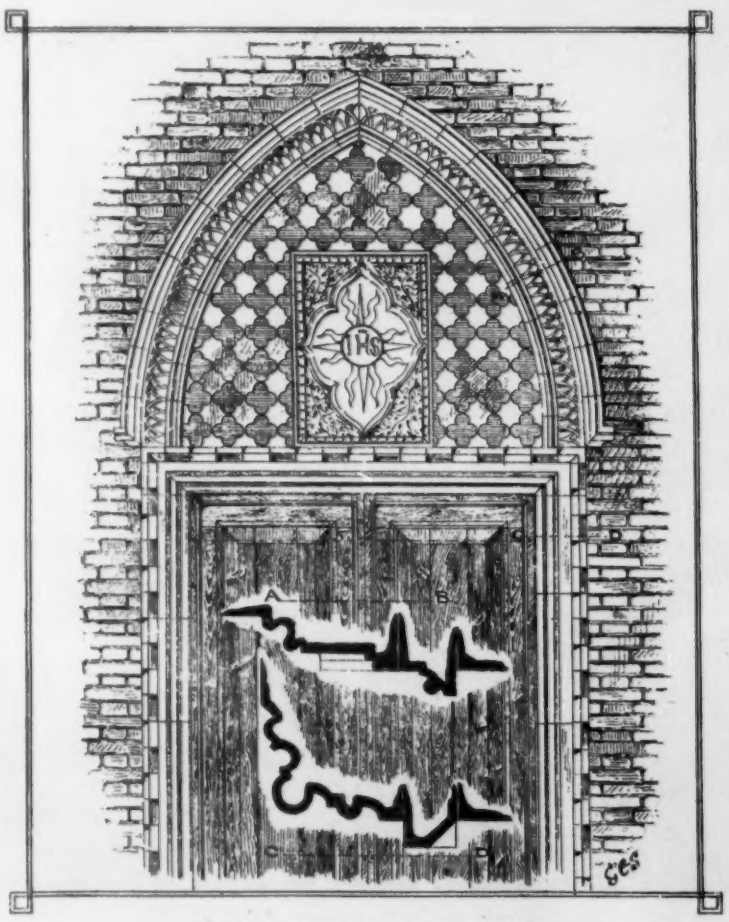
The angle-shafts of the Palazzo Foscari have caps and bases in each stage of the building; those of the other palaces continue up without interruption.

The date of the smaller palaces, and probably of the large one, also, is very early in the fifteenth century; and the latter had, in 1574, the honor of being the grandest palace that the Venetians could find in which to lodge Henry III. of France. They are all three very similar in their design. Their water-gates are pointed, and the windows in the water-stage small and unimportant. The second stage is more important, and has cusped ogee window-heads and balconies. The third stage is, however, the *piano nobile*, all the windows having deep traceried heads and large balconies. The fourth stage is very nearly like the first, save that, instead of balconies, there is a delicate balustrading between the shafts of the windows, which is very frequent in good Venetian work, and always very pretty in its effect. All the windows in these three palaces have ogee-heads, generally finished with carved finials, and enclosed within a square outline formed by the small dentiled molding, and giving what I have before had to refer to,— to some extent the effect of a panel with a window pierced in it, veneered on the front. The Foscari Palace is the only one of these three that has any string-courses. The arrangement of the windows, —large in the center and smaller at the sides,— is so nearly regular, and of a sort of two-and-two kind of uniformity, that one scarcely notices that, nevertheless, when internal arrangements make it necessary, a departure from this strict rule is allowed.



BRICK BATTLEMENT, VENICE.

The back entrance to the Foscari Palace is on the side canal. It is of some interest as retaining in a very perfect state an example of a very picturesque treatment in brick of the Venetian battlement. This consists of a series of piers finished with a steep gabled outline and pierced with trefoiled openings. A good example of this sort of battlement remains near the Fondaco de' Turchi, and deserves illustration. It is quite a Venetian invention, and errs on the side of quaintness.



DOORWAY, PONTE SAN TOMA, VENICE.

In a small courtyard, desolate and dreary, reached after crossing the Ponte di Paglia and one or two other bridges on the Riva dei Schiavoni, is the Palazzo Badoer, a fourteenth century palace, the ogeed arches of the windows in which are more than usually good; whilst the beauty of the central window, enclosed within a square line of molding, within which the wall is incrusted with marble relieved by medallions, is very great. The structure of this, as of most Venetian palaces, is brick which has been frescoed; but it is now in a very lamentable state of decay. The balconies of the lower windows are clearly modern, but there is a trace of the original balustrade between the shafts of the windows in the second stage; and in front of the side-light to the upper window is a grill of iron work, taking the place of a balcony and composed of a combination of quaterfoils. The arrangement of the windows in this front is not absolutely regular, but still the center is very marked; and, though it is of early date, the true use of the arch nowhere appears. The usual [1] dog-tooth cornice finished the walls under the eaves. In the courtyard of this house are two of the wells which give so much character to all the courts in Venice. They appear generally to be of early date, and look, frequently, like the capitals of large columns, taken down and placed upon the ground. Those in front of the Palazzo Badoer are perhaps more like fonts.

(*To be continued.*)

CLUB NEWS.

THE Chicago Architectural Club makes the following announcement regarding the classes for the coming year: —

Water Color, Hugh M. G. Garden; begins Sunday morning, October 20. Architecture, Geo. R. Dean; begins Tuesday evening, October 22. Pen and Ink, Chas. E. Birge; begins Thursday evening, October 24. Modeling, Richard W. Bock; begins Friday evening, October 25.

On Monday evening, October 21, Mr. Myron H. Hunt addressed the club on "The Impecunious Draughtsman Abroad."

THE first of Professor Marquand's articles on the work of Della Robia will appear in our December number. These articles be beautifully illustrated from original photographs.

[1] I say "usual" because it is really quite curious to see how repeatedly either the dog-tooth or the nail-head is used in this position. The commonest eaves-cornice consists of a simple chamfered stone — the chamfer covered with dog-tooth — supported on molded corbels at short intervals.

ARCHITECTURAL TERRA-COTTA.

BY THOMAS CUSACK.

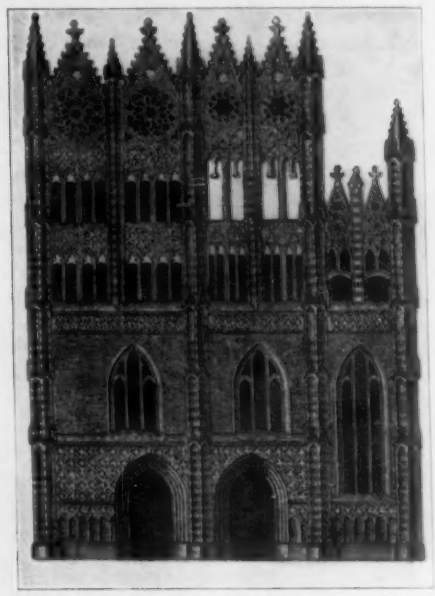
(*Continued.*)

IF the boy is father to the man, so is the ordinary building brick the forerunner of all other shapes and sizes of burned clay that have been used in endless combinations from time immemorial. Taken together, they have a common origin, a natural affinity, inalienable associations, and the same manifest destiny. A word, then, on an important and serviceable class of architecture, in which a brick has been the unit of measurement. For some of the best instances of this, we turn to the Baltic provinces of the German Empire, which are literally studded with brick buildings of very considerable magnitude and high architectural merit. From the Ems to beyond the Vistula the self-reliant old-time architects of Northern Germany studied the physical characteristics of the chief building material within reach, either geographically or financially. The Gothic churches, castles of the territorial rulers, municipal and domestic buildings which they erected all show that their painstaking efforts were not made in vain. To an unmistakably practical knowledge of their materials they added much originality of thought and a fertility of resource that proved equal to every emergency. The harmonious and highly successful combinations which they were able to make of brick and terra-cotta will be found exemplified on every hand in most of the towns of Hanover, Macklinburg, and Pomerania. In the town of Macklinburg there is the church of St. Catherine, which has often been referred to as a conspicuous example of the class of building under consideration, and the church of St. Mary in the same town shows what can be done with a very limited range of materials, when their arrangement is in the hands of a man who has mastered their geometrical and mechanical possibilities. In it the whole thing is executed in black glazed bricks, set in projecting patterns, and in alternating bands on a ground of red brickwork. These and other combinations were made to produce the same general effect as had been obtained elsewhere by the insertion of colored marbles or

CHURCH OF ST. CATHERINE, LUBECK.

by an incrustation of costly mosaics. And if the result be at all lacking in refined detail, or if it appears less ornate under minutely critical inspection, it must be remembered that it was obtained at vastly less expense, and that it is free from the elements of sham, which is more than can be said for any form of mere surface decoration. These buildings convey the impression of life and simple vigor, which is not only in keeping with the style, but indicative of the people by whom and the purposes for which they were erected.

The brick buildings of Spain are numerous, and some of them well known. During the Middle Ages brickwork seems to have been



PORTION OF FACADE, CHURCH OF ST. MARY, BRANDENBURG.

carried out on a very extensive scale, in some districts but little else being used. The towers of Tarazona, Toledo, and Saragossa, whether leaning or vertical, are very striking erections. Many of them have the strength and solidity inspired by Roman traditions, with the rich detail and reticulated ornament easily traceable to the Moors. Brick was also the popular building material in the south of France, more especially in the neighborhood of Toulouse, where some very ancient and excellent examples may be found. The church of the Jacobites may be instanced as a good type of these. It drew from Viollet le Duc the very decided opinion of being "one of the most beautiful brick churches constructed in the Middle Ages," which was praise, indeed. It is now used for military purposes, but is in a good state of preservation, and is worthy of being cared for as a national monument. Its octagonal tower, of bold Gothic outline, bears a strong resemblance to the world-famous belfry of Bruges.

Belgium is preeminently a country of brick buildings of early date and much architectural interest. There was a time when Flanders had a foremost rank among the commercial centers of Europe. The money-lenders of Antwerp were not prone to bring down the rate of usury, and when patronized, as they were frequently, by the crowned heads of Germany, France, and England, their ducats brought a return of twelve per cent. Guicciardini asserts that at the beginning of the sixteenth century, at certain seasons, two thousand five hundred ships anchored in her harbor at one time, and that "it was usual for five hundred ships to come and go in one day." The chief cities could therefore well afford to build churches, bourses, city halls, and other public buildings on a scale of corresponding grandeur and magnitude. The town hall of Xpres was commenced in 1230, and its erection covered a period of more than a century. It is 470 ft. long, and its builders were slow; but they never doubted that they were engaged on something that would remain after them, and so they piled brick on top of brick with unwearying patience and deliberate intent. Les Halles, or Cloth Hall, of Bruges, with its renowned belfry, and the older portion of the neighboring church of St. Sauveur are of nearly the same date, and, taken together, these comprise three of as worthy

and well-known erections in brick as can be found in any age or country. They have all been the scene of many pilgrimages, and sources of perpetual inspiration alike to artists and architects in search of the picturesque. Xpres, Bruges, Antwerp, Mechlin, etc.,

are still the Mecca of modern architects, who, uniting business with pleasure, spend their holidays in quest of a style. The wealth and variety of the suggestions to be found there have helped some of them to conjure up new and very successful combinations of form and color, first in England, and now in America. This interchange of ideas and comparing of architectural notes have, in our age of easy travel and free intercourse, become international. We now hear of the Tudor Gothic of Oxford and Cambridge being transplanted in Ostend and elsewhere, though none of our own skyward business blocks have yet been reported from either "the lazy Scheldt or wandering Po."

Holland differs but little from its neighbor in matters of style or the kind of materials used, unless it be in the direction of greater modesty. The phlegmatic countrymen of Rembrandt adhered to their own sense of the artistic, until they created for themselves something that is national and indigenous. Their style is vernacular; it makes no pretense of being founded on any classical precedent, but to them it is much better as it is. It is certainly well suited to the needs of domestic architecture and admirably adapted to the nature of the material commonly used in the Netherlands. In its total absence of ostentation it is typical of a proverbially industrious and unpretentious people. To them, in fact, it is like Audrey in the eyes of Touchstone, "a poor thing, but mine own." Holland, no less than Belgium, has been explored of late years, and the architectural tourist has had no reason to come away empty-headed, nor yet empty-handed, in so far as subjects for his sketch-book are concerned. Both countries are rich in dainty architectural conceits and quaint methods of treating the most ordinary features of a brick building that seems to lift it out of the commonplace and invest it with a character and individuality of its own.

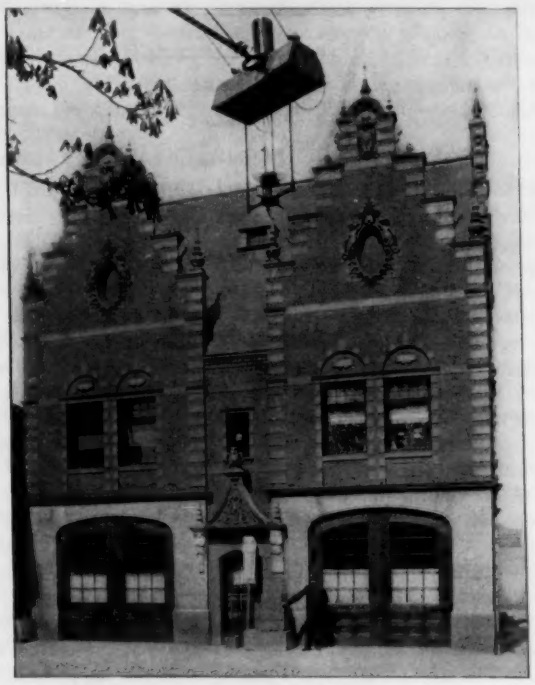
Of these we have the gabled façade of crow-stepped or curvilinear outline, sometimes with curved horns projecting at regular intervals; mullioned windows, with elliptical arches, frequently recessed in jambs of molded brick to a height of two or three stories, producing a vertical as distinguished from a horizontal effect; pedimented and many finialed dormer windows, rising so high and reaching so near the verge of stability as to call for wrought-iron supports, affording much scope for ornamental bands and scroll work; overhanging upper stories, corbeled and arched projections, carved and cusped brick panels, with here and there a suggestion of Gothic tracery. Well-designed chimney stacks are made a prominent feature; octagonal belfrys, hexagonal turrets, and eccentric-looking tourelles are to be seen in great variety and profusion. Most of these characteristics are now being reproduced very freely in America, which, truth to tell, is no great misfortune in a land of lingering Knickerbocker traditions, and especially in a city once called New Amsterdam and the domicile of a flourishing "Holland Society." One real misfortune is that our latest importation of style is often too much like a duplicate of the original, and where this is not so there is a tendency to degenerate into what has been facetiously described as Queen Anne in front and Mary Ann towards the rear. Another one, equally real, is that our face-brick are laid in a veneer of all stretchers, instead of the genuine Flemish or English bond, either of which is sound and substantial, and capable of producing a far wider range of pleasing optical effects.

The quaint old Market Hall of Haarlem has, by the way, become a wonderfully prolific prototype of late years. It has already furnished the predominating motif in several interesting combinations of terra-cotta and brick in various parts of this country, which, though not in chronological order, may be referred to here briefly for sake of a continuity of ideas. Chief among these comes the Collegiate Church, on Seventy-Seventh Street and West End Avenue, New York City, by R. W. Gibson. This is not by any means a copy, but a legitimate and frankly avowed adaptation of certain familiar features of that curious old building, modified on the one hand, and expanded on the other, to suit a different site, to harmonize with very different surroundings, and treated so as to come into conformity with wholly different associations. The much discussed and as much admired Wolfe Building, Maiden Lane, William and Liberty Streets, New York, betrays the same source of inspiration in many of its details. Beyond this, the extreme height of the building and the exigencies of the site put an end to further comparison. As has

RESIDENCES IN INDIANAPOLIS, IND.
Louis H. Gibson, Architect.

been elsewhere observed, the treatment of the mass is free and well fitted to a most inexorable environment. Having once seen this building, one comes away with the fixed impression that the architect had studied the ancient example in the light of a modern necessity,

until he became master of both. There is an engine house in Rochester, N. Y., by Nolan, Nolan & Stern, a leading firm of architects in that city, who freely admit that the initial suggested for it originated in the land of dykes and windmills. They, too, have taken advantage of the vigor and adaptability of the gable façade, and the



ENGINE HOUSE, ROCHESTER, N. Y.
Nolan, Nolan & Stern, Architects.

result may be counted as one more picturesque and very appropriate municipal building in brick and terra-cotta that reflects credit on the judgment of those engaged in its erection. There is a well-conceived and variously treated group of high-class private dwellings on West End Avenue, New York, taking in the entire block between and extending some distance along Eighty-Fourth and Eighty-Fifth Streets. Of these Frank Miles Day, of Philadelphia, is the architect. A speckled buff Roman brick and cream-white terra-cotta are the materials used above the stoop line, and the effect is harmonious and attractive. The style at first sight might be called Flemish, but on closer inspection it will be seen that the immediate inspiration came from Chelsea Embankment, or Harrington Gardens. In these and many other newly built up districts in the great West End of London, Earnest George & Peto, Norman Shaw, and T. E. Colcutt, etc., have within the past dozen years produced an Anglicized version in which the best features of the originals are deftly blended with others of native growth and with new departures of marked originality. In the work of these architects a consistent modern domestic style has been evolved that is worthy of study, and will be found capable of further adaptation to the varying conditions and requirements of American life. It is essentially an architecture of brick, admirably suited to the employment of clay products such as are now under consideration and within the reach of all classes of the community, from the multi-millionaire to the man of more limited means.

(*To be continued.*)

NEW YORK CITY is putting a great deal of money into important real estate improvements. The value of the new buildings begun in the city during the first six months of the year shows an increase over the same period in 1894 of more than $32,000,000.

BRICKWORK IN NEW YORK CITY.

A STUDY of the constructive and ornamental brickwork existent or at present proceeding in New York City is well worth an examination, as it embraces almost every description of construction and the use of the best and most modern materials, in addition to the high class of workmanship which their excellence warrants. As a resident of the city, I have had plenty of opportunity to examine it, and am pleased to give the result to THE BRICKBUILDER.

In the absence of any skew arches, which, undoubtedly, entail the best bricklaying, I think the series of elliptic arches which span the transverse roads through Central Park, at 66th Street, 86th Street, and 92d Street, are the best specimens of constructive brickwork on a large scale in the city. Fig. 1 will give the reader a clear idea of the construction. As will be seen, they are elliptic arches, having brownstone faces and abutments, the interior soffits and arches being of brick, as seen in the illustration. The bricks are laid in cement to a close joint, and are evidently North Rivers, very hard and selected with a smooth edge. In spite of the fact that these arches have been in position since Wm. M. Tweed's administration, and that a soakage of water from the roadways above is percolating through the soffits, they are still sound, with the exception of an odd brick here and there which has dropped down, either from being small in dimensions or imperfectly bonded. These arches are well worth examining, as elliptic brick arches are not often built now, engineers considering

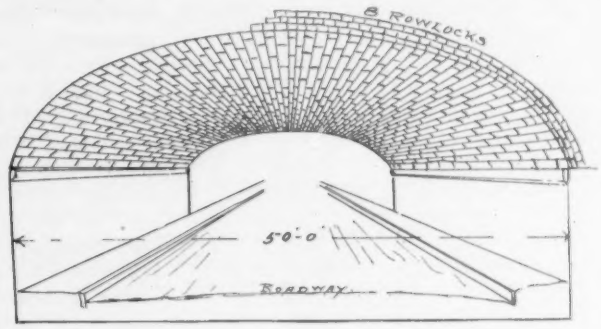


FIG. 1.

them weak at the haunches; but their beauty of design and graceful outline add to the effectiveness of the landscape.

Fig. 2 is the scheme of the arches being turned on the new bridges at 90th Street and Cathedral Parkway. It consists of a series of chordal arches turned in between the steel I beams, the skew-back of the bottom ring or rowlock resting on the bottom flange of the beam, as seen in the illustration. Peculiar centers were required for these arches on account of the tie-rods coming through the arch and showing on the soffit. They were so constructed that the lagging of the center stopped at one side of the rod and commenced on the opposite side, thus permitting the center to be lowered

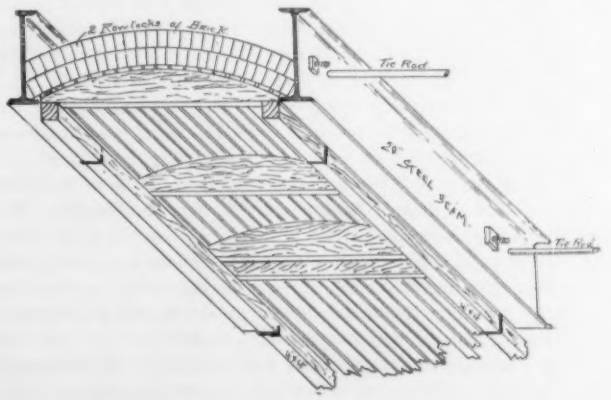


FIG. 2.

down and raised up again after the cement had set. The lagging was laid close and the bricklayers worked directly on it, grouting and pointing the joints as the courses were laid from the skew-back to the key. These arches are 4 ft. 11 ins. wide and 22 ft. long. The centers were hung on hooks for lowering purposes and lowered with ropes.

Fig. 3 will give a clear conception of the manner in which the hooks and clips were made to hang over the I beams, and the nut was used for the purpose of raising or lowering the center to regulate the pitch of the skew-back.

I will now draw attention to the circle over circle arch now very generally being introduced on flats and apartment houses. This is caused by architects rounding the corners of their buildings where streets cross. If the elevation of the windows have a circular head, then the brick arch is twisted and oftentimes gives the front bricklayer much trouble in turning his arch, especially where the center is insufficient. A job of this kind is now being erected at the corner of 126th Street and St. Nicholas Avenue, but is not so troublesome, as the brick are easily rubbed or chipped down. In cases where hard mottled brick are used, it is best for the architect to give a diagram of the arch to the brick manufacturer and have the voussoir brick specially made. The work of this kind, however, which has been executed so far is very good, but the corners are of sharp radius and the windows narrow. Flat, circular arches, or "*brick lintels*," as our English cousins term them, are now greatly in vogue, and are simple to turn, the only important matter being the setting and pointing of the joints. Speculative cheap buildings now being erected here have, as a rule, much inferior facework to that put in the building described in the foregoing, which is intended for a hotel, but the general standard of the work as a whole is getting better every year. The improved quality of the brick now on the market warrants this and improves the workmanship. So much is this evident that I can cite several houses which the owners painted over and had brought out to represent mottled brick, claiming that the improved and modern appearance of the property would bring him a better paying and more respectable class of tenants. In a word, appearance in exteriors goes far in this cosmopolitan city towards making renting property profitable, and the brickwork and terra-cotta predominate in designing or attractive building.

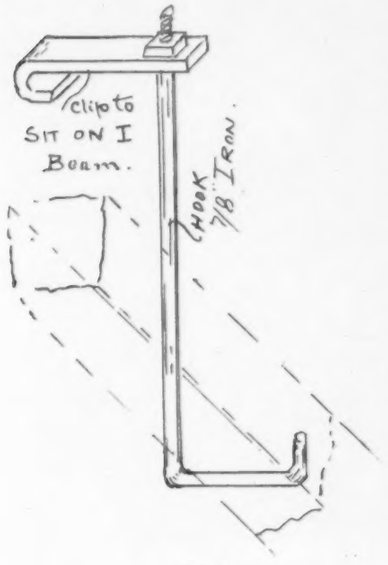


FIG. 3.

I think the best brickwork at present being done in the States is on the new St. Luke's Hospital, on Morningside Heights. The front brick is of a yellowish tint, and each brick comes to the building wrapped in tissue paper. As far as I can learn, they were specially made for this job and are, like the whole construction, excellent. Much credit must be given to Mr. Townsend, the superintendent, for his close watching of every detail.

For the student of architecture and building or for the apprentice bricklayer, I know of no better school than using his eyes in the streets of New York.

OWEN B. MAGINNIS.

Fire-proofing Department.

Conducted in the Interest of Building Construction to Prevent Loss by Fire.

FIRE-PROOF FLOOR ARCHES.

(*Continued.*)

BY GEORGE HILL, C. E.

FIRE-PROOF FLOOR FRAMING.

INTIMATELY connected with the subject of fire-proof floor arches, forming, in fact, the other half necessary to make the complete whole of a fire-proof floor, is the subject of the framing which supports the arch. Whether we consider it from the point of view of owner, architect, engineer, or builder, we must keep the two parts in view, and in order to accomplish correct results must give each its due weight in proportion to the work which is to be done between them. Before, however, we can finally determine any of the elements, we must co-ordinate them with the building in which they are to be placed, so as to be assured that for the combination of locality, site, use, and expense we are obtaining a result with the minimum of cost and maximum economy.

In considering the floor framing, it is necessary to take into account not alone the girders and beams, but also the walls or columns which support them. The whole subject is susceptible of being brought within the control of certain general laws which it will be our endeavor to lay down.

We will consider, then, *first*, the question of columns or other points of support. Usually, it will be found that the current work in various localities tends toward putting in as few supports as possible, and an investigation of the way in which this practise developed will usually trace it back to a condition of affairs totally different to those existing at the present time.

Keeping in mind that the work that we propose to do will, if it is well done, be good architecture, we must have our plans symmetrical. The points of support which we determine on should be uniformly placed and occur in natural locations, and by this we mean that if the front of our building is divided into seven bays our points of support should come immediately in line with these bays, and not be so disposed as to have five or six. Then, again, the axes of our buildings should be marked by openings, rather than by piers, and so in a 50 ft. front it would be bad practise if we designed a central row of columns running down to a central pier in the façade. The uses to which the building is to be put, and the peculiarities of the locality, by which we mean North, South, East, or West in the country, will, in a general way, determine the advantageous size of a subdivision in an intended building. This peculiarity is also to be observed in different parts of the same city; thus, in certain parts of New York, a building in which the offices average 10 ft. wide and 15 ft. deep will rent to far greater advantage than an adjoining building in which the offices are 15 ft. wide and 20 ft. deep, while in other localities the smaller office would go begging. Again, in certain locations in Philadelphia, and also in Chicago, offices 18 ft. wide and 20 ft. deep, with an inner office 12 ft. or 15 ft. wide, poorly lit, are in much demand for certain classes of tenants.

The width of the subdivisions makes it desirable that the points of support should be a distance apart equal to some multiple of the subdivision, so that space may not be lost by a column coming in the center of a room, — a peculiarity that will be observed in many published plans, which, however, is not only bad architecture and absolutely inexcusable, but has always been attained by a greater outlay than would have been necessary had the designs been properly made.

In buildings required for mercantile purposes, or, as they are designated in New York, lofts, where there are no subdivisions, the natural tendency is to decrease as much as possible the number of

columns which are employed, and here other considerations, which will be subsequently noted, are involved.

Second. — The uses to which the building is to be put, and the commercial limitations upon the depth of the beams which can be rolled, will affect the spacing materially, since, while we must always keep in view the need for stiffness in our floors, and therefore make the depth always at least one twentieth of the span, we must also keep in mind the fact that where manufacturing is going on the tendency to vibration is very great; and wherever there is vibration, the tendency to synchronism in the vibration is always great, and, in consequence, the stiffness of the floor should be materially increased to guard against it.

Third. — The exposure of the building to the light, and the effect which projecting girders have upon the travel of light along the ceiling, is very noticeable. A room which has an absolutely flat, smooth ceiling will be better lit than the same room with projections below the line of the ceiling in direct proportion to the number of projections, and the projections themselves will have more effect on cutting off the light if they run in a northerly and southerly direction than if they run in an easterly and westerly direction.

Fourth. — The closer the columns are spaced together, the less weight of metal will be required both in the floor and in the supports, and the less expensive will the floor blocks be, taking as a minimum a spacing of 10 ft. by 11 ft. 3 ins. The only limitations or exceptions to this rule are those imposed by expensive erection and excessive thickness of metal in the columns due to the practical requirement that cast iron should be not less than ¾ in. in thickness and rolled iron or steel not less than $\frac{5}{16}$ in.

In the *American Architect* for March 17, 1894, the writer published two tables giving in detail data referring to fire-proof floor frames and weights of columns, and the interested reader is referred to these tables as a means of intelligently studying the problem of construction which he may have. They may, however, be briefly summarized, as has been done below, and the framing actually designed, keeping in view the principles above noted. These tables were calculated on a basis for the beams of taking the maximum and minimum weights of each size of beams rolled from 6 ins. up to 15 ins.; determining the maximum span on which it was safe to use these beams for office building floors, and then finding the maximum spacing for a fiber strain of 12,000 lbs. per square inch, and ascertaining the most economical girder to be used, the length of the girder being three, four, or five times the beam spacing. As a consequence, the number of square feet of floor supported ranged from a minimum of 112.5 sq. ft. to a maximum of 666.67 sq. ft. The weights of framing for both beams and girders for these various spacings per square foot of floor supported are also given. There were also given memoranda concerning the sizes of floor arch blocks which can be safely used in connection with the above, indicating which is the more economical to use. In another table is given the weight of column required to support 100, 200, or more square feet, and from one to twenty stories in height; the column weight running from about 500 up to 53,000 lbs.

TABLE I.

WEIGHTS OF FRAMING.

Beam lengths are given first; then lengths of girder, and then weights per square foot of floor supported.

10′ 0″ by 10′ 3″ — 5.6	10′ 0″ by 15′ 0″ — 6.7	10′ 0″ by 18′ 9″ — 7.6
10′ 0″ by 12′ 0″ — 6.55	10′ 0″ by 16′ 0″ — 8.1	10′ 0″ by 20′ 0″ — 8.8
11′ 8″ by 11′ 6″ — 6.18	11′ 8″ by 15′ 4″ — 7.42	11′ 8″ by 19′ 2″ — 8.2
11′ 8″ by 13′ 6″ — 7.16	11′ 8″ by 18′ 0″ — 8.44	11′ 8″ by 22′ 6″ — 10.5
13′ 0″ by 12′ 0″ — 6.65	13′ 0″ by 16′ 0″ — 7.66	18′ 0″ by 20′ 0″ — 9.12
13′ 0″ by 15′ 0″ — 7.17	13′ 0″ by 20′ 0″ — 9.02	13′ 0″ by 25′ 0″ — 11.4
15′ 0″ by 11′ 9″ — 7.36	15′ 0″ by 15′ 8″ — 8.11	15′ 0″ by 19′ 7″ — 10.63
15′ 0″ by 15′ 9″ — 7.94	15′ 0″ by 21′ 0″ — 10.67	15′ 0″ by 26′ 3″ — 13.2
16′ 8″ by 12′ 9″ — 7.98	16′ 8″ by 17′ 0″ — 9.30	16′ 8″ by 21′ 3″ — 11.47
16′ 8″ by 16′ 6″ — 8.88	16′ 8″ by 22′ 0″ — 11.77	16′ 8″ by 27′ 6″ — 13.68
20′ 0″ by 13′ 3″ — 9.24	20′ 0″ by 17′ 8″ — 11.77	20′ 0″ by 23′ 1″ — 12.70
20′ 0″ by 16′ 9″ — 10.1	20′ 0″ by 22′ 4″ — 13.1	20′ 0″ by 27′ 11″ — 14.08
25′ 0″ by 13′ 0″ — 12.36	25′ 0″ by 17′ 4″ — 14.25	25′ 0″ by 21′ 8″ — 16 2
25′ 0″ by 16′ 0″ — 13.31	25′ 0″ by 21′ 4″ — 16.3	25′ 0″ by 26′ 8″ — 17.1

TABLE II.

Table of column weights; read from small plot, and therefore not absolutely correct. Calculated for office buildings and for a decrease in the live load as the number of stories increases.

No. of Stories.	Area Supported.				
	100	200	300	400	500
1	550	550	550	550	550
2	800	900	950	1,000	1,000
3	1,200	1,400	1,400	1,800	2,000
4	1,600	1,800	2,000	2,800	3,200
5	2,000	2,400	2,950	3,900	5,800
6	2,450	3,000	3,900	5,100	6,500
7	2,800	3,800	5,100	6,900	8,600
8	3,300	4,600	6,500	8,800	10,600
9	3,700	5,600	8,000	10,500	13,000
10	4,200	6,600	9,500	12,500	15,800
11	4,800	7,800	11,200	15,000	18,700
12	5,400	9,000	13,000	17,200	21,700
13	6,000	10,300	15,100	20,100	25,900
14	6,700	11,800	17,000	23,000	28,500
15	7,400	13,100	19,100	25,600	31,900
16	8,100	14,700	21,600	28,900	35,800
17	9,000	16,300	24,000	32,000	39,900
18	9,900	18,000	26,800	35,500	44,000
19	10,800	19,800	29,300	39,000	48,500
20	11,600	21,500	31,800	42,400	53,000

The proper procedure, then, in the laying out of the floor framing is to have the columns disposed in symmetrical and natural lines where they will fall on natural division points in the completed building, running through continuously from foundation to roof, unless there is some special reason in the upper stories for the omission of certain of them. Under no circumstances is it either good architecture or good engineering to do stunts in the way of supporting columns over big rooms by heavy trusses, building trusses in partitions, and other similar matters, and such a condition of affairs, therefore, should be avoided. The most effective disposition of the columns and girders can be determined by trying various spacings which come within the divisions of the building and ascertaining the weight per square foot of floor corresponding thereto from Table I., and multiplying it by the number of stories and adding thereto the weight of column from Table II., determining the weight by interpolation from the even areas given, and selecting that disposition of the columns which gives the lowest result. The cost of erecting columns is generally figured as an increase on the base charge per pound, and not by the number of columns, so that, unless there is a marked difference in the number of columns, that result will be the most economical which has the least weight per square foot of floor supported, taking into account both floor framing and column weight.

In all of the above but little has been said concerning the limitation of depth of floor arch block on beam framing, for the simple reason that the 12 in. block, which is the largest size manufactured, is amply strong for the greatest spacing of beams which we have considered. Buildings require flat ceilings, and so segmental arches are debarred, and they also require to be made as rigid as possible in a horizontal plane, and so any thin, flimsy floor construction which might bear the vertical loads sufficiently, but no other, is debarred.

The question of the proper depth of block to use for filling to meet particular cases within the limiting spans required by Table I. will be considered at the end of the articles on Fire-proof Floor Arches.

A FIRE recently occurred in the basement of the new Carter Building, Boston, which is used as a restaurant, that, undoubtedly, would have developed into a serious conflagration had it not been that the piers of the building were protected by fire-proofing, the whole building, in fact, being fire-proof construction.

The fire, which started in the early hours of the morning, probably as a result of defective electric wiring, destroyed a lunch counter which was built between two piers and a large closet containing the table linen, but had nearly burned itself out before the arrival of the firemen. A new lunch counter and linen closet, the plastering patched, a coat of paint, and all was as good as new.

Mortars and Concrete Department.

Devoted to Advanced Methods of using Cements and Limes in Building Construction.

STANDARD SPECIFICATION FOR CEMENT.

REPORT OF THE COMMITTEE ON "ARCHITECTS' PLANS AND CONTRACTS" OF THE MASTER BUILDERS' EXCHANGE, PHILADELPHIA.

AT a quarterly meeting of the Master Builders' Exchange of Philadelphia, held September 24, the question of standard cement specifications was brought up for final action by the Committee on Architects' Plans and Contracts, submitting their report as to what a standard specification of cement should be. After some discussion the report was unanimously adopted, and the secretary of the exchange ordered to have sufficient copies printed for distribution.

There was some question as to whether the required strength for Portland cement should not be higher. Mr. Jos. E. Balliet, president of the "Saylors Portland Cement Works," being present, was asked by Mr. Gillingham, president of the Master Builders' Exchange, as to his opinion of the matter, and in response said that, although the cement manufactured by his company stood higher tests than those mentioned, when properly tested, he thought these tests were high enough to prevent a faulty cement from being used, and also would not confine the bidding to only a few brands.

Mr. Robert W. Leslie and Mr. Ralph Peverley followed, stating that the strength required by these specifications would prevent the use of inferior cements. There was considerable question in the minds of many of the members present as to the advisability of having two classes of tests. Mr. Francis G. Schumann, chairman of the committee which submitted the report, upon being questioned about the idea, said he thought these specifications were the first to make a distinction between the tests made under proper methods and those made on work by inexperienced people. From investigations carried on by the Engineer Commission at Washington, D. C., and by the Department of Public Works, Philadelphia, it was found that the difference between tests carried on under the two different methods was 25 to 40 per cent.

Whether or not it was advisable to have two forms of specifications was seriously questioned by Mr. Franklin M. Harris, Sr., Wm. B. Irvine, and Wm. G. Hartranft. It really is a serious question whether cement manufacturers should have to submit a cement to pass certain requirements where tests are to be carried on by acknowledged inexperienced people, and we think all our readers will agree that the test which is to be carried on under defined and accurate methods is the most commendable.

THE REPORT.

To the Directors of the Master Builders' Exchange of Philadelphia, Pa.

GENTLEMEN: — Your committee, to whom was referred the matter of standard specifications for cements, beg to submit the following report: —

The desirability, in fact, necessity, of standard specifications for materials used in building construction, has been expressed by the continued agitation of the subject through the various associations affected thereby, such as the civil engineers, architects, and master builders.

While steel and iron are now practically subject to standard requirements, cement, an article fully as definite in its nature and required physical results, is still described in specifications in most vague and varying language, and a diversity of required properties that cannot but create confusion and tend to disputes and litigation.

In the past, when the consumption of cement was but limited and the manufacturers were few, and those confined, practically, to one country, England, it was sufficient to specify the name of the maker or his brand, and because of the integrity of the maker, satisfactory results could be expected.

As the demand increased, its manufacture spread rapidly, extending to all countries. The increased production caused close competition, and, as a natural result, the gradual introduction of inferior cements followed, the making of which was not confined to any one particular maker or country.

As a consequence, old, reputable brands, the quality of which had been maintained by their makers, were generally adopted for the better class of work, to the exclusion of those brands by makers but recently established, yet producing an article equal, if not superior, to that of their older competitors.

Thus, by reason of a lack of a proper standard, purchasers limited their specification to the mention of a brand, excluding the product of manufacturers who were aiming to make the best and compelling them to compete in price with an inferior product.

To foster progress is one of the precepts of this association, and no better opportunity can offer to prove our sincerity than active agitation towards the establishment of a uniform standard specification for cement.

Your committee deemed it wise to precede the specification with certain brief explanatory remarks as an introduction: —

The cements now used in building operations are practically confined to two classes, "Natural" and "Artificial" or "Portland Cement."

A Mr. Parker is supposed to have been the inventor of the natural cement of modern times. A person of that name took out patents in England about the beginning of this century for what he called "Roman Cement."

NATURAL CEMENT, as now made, is from stone in which the lime, silicates, and aluminates are in such ratios that when the carbonic acid is expelled the lime is in such proportions as to make a hard compound with the silica and alumina. These stones are usually found in strata amongst those of hydraulic limestone. After burning they are ground to a powder, which must be kept dry until used. This powder consists of a mixture of lime with silicate of alumina. When made into a paste with water, chemical action takes place, and a double silicate of alumina and lime is formed, which tends to form a compact artificial stone.

Its great utility and difficulties in obtaining the proper stone impelled makers to experiment in producing the article by artificial means having the same characteristics. The continued attempts by different parties in the first quarter of this century finally resulted in the article now known as "Portland Cement," so called from its resemblance, when dry, to the Portland stone in color; a stone found on the islands off the coast of Dorsetshire, England, and of which many of the larger buildings in London are built.

PORTLAND CEMENT, according to the best authorities, is defined to be an artificial cement. It is made by an artificial admixture of limestones and argillaceous rocks, marls, chalks, clays, or other similar materials in the required proportions, mixed thoroughly into a paste with water in a pug mill, making the paste into balls or cakes, drying and calcining them to incipient vitrifaction, and finally grinding them to a powder, ready for shipment in bags or barrels. Portland cement not only possesses the property of setting more quickly and has greater power of cohesion than natural cement, but it may be used with a superabundance of water, which they cannot. It resists the action of the sea water better than all other cements, and is proof against water when used as a mortar and in the composition of concrete for foundations, lining of cisterns, or surfaces of pavements or roads. The ingredients necessary for making this article are found in all parts of the world.

In addition to the two classes of cement above mentioned,

there is made in Belgium and in certain parts of Europe a natural cement resembling Portland cement in color, which is made by calcining to a clinker natural cement rocks and grinding the same to powder.

There is also made in America an "Improved" cement, which is made by grinding together natural cement-making material in a calcined condition and Portland cement clinker, and which is sold as an improved natural cement.

It is not the purpose of your committee to originate any items of requirements, but to submit a specification which is in so far a standard, in that it unites and expresses the intents of the specifications emanating from the greater portion of the architects and engineers in this country, which, taken separately, contain sufficient variableness, although having like aims, to cause confusion and doubt in the minds of cement makers as to what is really demanded in an ideal or standard cement.

In conclusion we would remark that the essential of the standard specifications recommended by the Society of Civil Engineers have been incorporated. (See Trans. Am. Soc. of C. E., Vol. XIV., page 475, November, 1885.)

MASTER BUILDERS' EXCHANGE.

Standard Specification for Cement.

Required Tests

Shall be for —

Specific gravity,
Fineness,
Checking or cracking,
Time of setting,
Excess of magnesia and sulphate of lime in Portland cement,
Tensile strength.

Classification of Manner of Testing.

Two classes of tests shall be optional: —

Class I. contemplates the conduct of the tests in a laboratory, designated by the purchaser, having all the necessary facilities and appliances for insuring accuracy and refinement of tests.

Class II. shall be tests made with more crude facilities and appliances, such as can be readily obtained at or near the site of the work, and where the specified conditions as to temperature, moisture, and mode of preparing test specimens cannot be fully met.

Packing.

No cement shall be received at the works unless securely packed in good tight bags or barrels, properly marked and branded.

Inspection.

All cement shall be subject to inspection, and those rejected shall be immediately removed from the work by the seller of such cement.

The purchaser reserves the right to take samples from each lot or each barrel or bag of cement delivered, and subject them to tests either under Class I. or II., and to accept or reject the cement in accordance with the results of the tests.

Storage.

The purchaser of the cement is to provide suitable storage facilities for the cement, well protected against the elements. Sufficient cement shall be stored in advance to permit a seven or twenty-eight day test, as may be determined by the purchaser, so as not to delay the progress of the work.

Cost of Testing.

The cost of the specified tests shall be borne by the seller.

Specific Gravity.

The specific gravity shall not be less than —

2.5 for natural cement,
3.0 „ Portland „

Fineness.

The tests for fineness shall be with two sizes of sieves: —

No. 50 made of No. 35 wire (Stubbs' gage), 2,500 meshes per square inch.

No. 100 made of No. 40 wire (Stubbs' gage), 10,000 meshes per square inch.

There shall pass, by weight, not less than —

Under Class I. Test.

96 per cent. through the No. 50 sieve natural cement.
80 „ „ „ 100 „ „ „
99 „ „ „ 50 „ Portland „
85 „ „ „ 100 „ „ „

Under Class II. Test.

93 per cent. through the No. 50 sieve natural cement.
75 „ „ „ 100 „ „ „
95 „ „ „ 50 „ Portland „
80 „ „ „ 100 „ „ „

Checking or Cracking.

Cakes or pats of neat cement are to be made 2 to 3 ins. in diameter and about one half an inch thick, drawn to thin edges at the circumference. They must show no indication of checking, cracking, or warping when exposed in the air or water at normal temperatures.

Time of Setting.

The tests for time of setting shall be for "initial" and "hard" set, and shall be determined with pats of neat cement one half inch thick at a temperature of between 60 and 70 degs. Fahrenheit. In making the pats just sufficient water should be used to result in a stiff plastic paste.

In the "initial" set the surface of the pat shall not suffer any impression from the square end of a short round wire one twelfth inch in diameter loaded with one quarter pound weight, while in the "hard" set a one twenty-fourth inch diameter wire loaded with one pound weight shall not cause any impression. "Initial" set shall not develop in less than ten minutes and "hard" set in less than thirty minutes in natural cement, while in Portland the "initial" set shall not develop in less than thirty minutes in "slow setting" Portland cement, and in ten minutes in "quick setting" Portland cement.

Sulphate of Lime.

The maximum of sulphate of lime in the form of gypsum or calcined plaster shall not exceed —

2 per cent. in Portland cement.

Magnesia

Shall not exceed —

3 per cent. in Portland cement.

Tensile Strength.

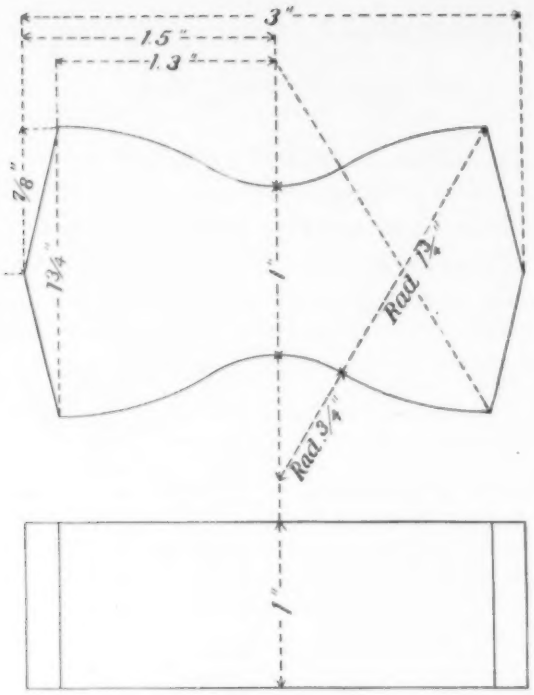
Tests shall be made with specimen pieces in the form of briquettes, as per sketch herewith, made in iron or brass molds.

Two sets of briquettes, of 5 each, shall be prepared, 1 set of neat cement, the other of cement and sand, all carefully proportioned by weight, as follows: —

Natural cement 1 part cement to 2 of sand,
Portland „ 1 „ „ „ 3 „ „

Method of Making Briquettes.

Sand. — The sand must be of crushed quartz, such as is used in the manufacture of sandpaper, perfectly clean and dry, and of such fineness as to pass through a No. 20 sieve (400 meshes to the square inch) made of No. 28 wire, Stubbs' gage, and to be caught in a No. 30 sieve (900 meshes to the square inch), wire to be No. 31, Stubbs' wire gage.



FORM OF BRIQUETTE. FULL SIZE.

WATER.

Ordinary fresh clean water, having a temperature of between 60 and 70 degs. Fahrenheit, shall be used for the mixture and immersion of the specimens. The proportion of water used in making the briquettes will be about

One fourth the weight of neat cement,

One sixth the weight cement and sand (1 cement, 2 sand),

One eighth the weight cement and sand (1 cement, 3 sand).

MIXING.

The cement and sand of the required proportion shall be mixed dry and all the water mentioned added by degrees, the mixing to be as rapid as possible to secure a thorough mixture of the materials.

MOLDING.

The mixture when stiff and plastic to be firmly pressed into the molds, without ramming, and struck off flush. The molds to rest directly on glass, slate, or other non-absorbent material. When sufficiently hard the briquettes, which are to be made one at a time, are to be taken from the mold and kept covered with a damp cloth until immersed. In the one-day test briquettes shall remain on the slab for one hour after hard set, and balance of time in water. In one-week or longer tests, they shall remain in air one day after being taken from molds, the remaining time in water.

After being taken from the water the briquettes are to be immediately put into the testing machine and the stress applied at a uniform rate of 400 lbs. per minute, starting at zero.

The temperature of the testing-room is not to be below 45 degs. Fahrenheit.

The average *tensile strength* in pounds per square inch of section of each set of five specimens, one hour in air and the remainder in water, shall not be less than

	Class I. Test.			Class II. Test.		
Natural Cement.	1 day.	7 days.	28 days.	1 day.	7 days.	28 days.
Neat	75	150	225	50	125	200
1 cement, 2 sand		80	140		50	100
Portland Cement.						
Neat	125	400	500	100	300	400
1 cement, 3 sand		125	200		90	150

SOME EXPERIMENTS WITH MORTARS.

WE do not often write about mortars, although bricks and mortar invariably go together, but, in the face of the attention which has during the past few months been given to the subject by our foreign contemporaries, we must needs step aside to consider some rather illuminating experiments which have just been made.

Builders are a class of people whom we naturally have to conciliate. They are usually most worthy men, but possessed with various prejudices, whilst their commercialism is admirable, however inconvenient we may sometimes find it. Now, it is a common belief amongst builders, especially amongst bricklayers and foremen, that it is much more advantageous to mix lime-mortar some days before it is wanted, rather than to mix it immediately before the bricks have to be laid.

To test this popular superstition — if we may be forgiven the expression — samples of mortar have recently been taken on successive days from two separate heaps of larger size. Small cubes of bricks were molded from these samples, and set aside for a definite period of weeks, and then broken, in order to estimate their tensile strength.

The following were the results: —

Sample.	Days in heap after mixing.	Days exposed to air as a small brick.	Average breaking stress in lbs. per sq. in.
Mortar No. 1	3	50	34.6
" "	4	49	38.6
" "	6	48	38.1
" "	7	46	39.3
Mortar No. 2	4	48	36.0
" "	5	47	38.0
" "	6	46	41.2
" "	7	45	41.5

The amount of calcium silicate formed was found to be exceedingly small, even after very long intervals of time.

Another notion that is very common amongst those who have to deal with the building of bricks into brickwork is that sugar and blood are very good things to mix with the mortars, especially with hydraulic mortars. Consequently, experiments were undertaken to test these views.

Hydraulic mortar tempered with sugar and water, at the rate of half a pound of sugar to the gallon, was found to be considerably stronger than the same mortar tempered with water alone. This was found to be true only if the mortar were allowed to harden exposed freely to the atmosphere. If the mortar were used for subsquares brickwork, no advantage was found to follow upon making the extra expenditure and taking the extra trouble with sugar.

The same mortar was also tempered with bullock's blood, diluted with one third of its volume of water. The mortar was then molded in a brick mold, and was found to set somewhat more quickly. It also showed a considerable increase in strength, both when exposed to the air as well as when laid under water.

Here are some experimental data: —

		lbs. per sq. in.
1.	Tempered with water alone	63.00
2.	" " sugar solution, and exposed to water during 38 days	62.75
3.	" " sugar solution, and exposed to air during 38 days	65.4
4.	" " diluted blood, and exposed to water during 37 days	68.3
5.	" " diluted blood, and exposed to air during 37 days	69.8

So it seems that there is some truth in these old notions; and those who hold them will now be able to give scientific reasons for their faith. — *British Clay Worker.*

The Masons' Department.

Conducted in the Interests of the Builder and the Contractor for Brickwork.

WITH the current number, THE BRICKBUILDER enters upon a new phase of its development, which, we believe, gives promise of usefulness, and it becomes the pioneer, to a certain degree, in a heretofore untrodden field.

The management of the paper has seen fit to change the name of this department, and consequently enlarge its scope so that it shall hereafter not only represent the builder and contractor for brickwork, but it will also seek to reach the firesides of the thousands of industrious craftsmen in this country who labor with the hammer and the trowel, and who by their skill and cunning have been so potent a factor in the production of American architecture. It will be the aim and object of this department: —

First. — To be in the future, as in the past, a medium of assistance and practical knowledge to the mason contractor and keep him constantly posted on all the advanced ideas and improved appliances essential to his welfare.

Second. — To be the firm and steadfast champion of the craftsman in the building trades as long as it is consistent with the well-known principles of this journal. We recognize in him the means upon which the architect and builder depend to gain their ends in the faithful and skilful execution of their plans.

The department will contain articles written by a corps of experienced writers, especially in the interests of the artisan in the several branches of his trade. It will be our constant endeavor to raise the craftsman to a higher standard of efficiency, to bring the product of his labor to the highest degree of excellence, and to place the hand that executes in a closer relation with the brain that conceives.

Third. — To encourage the regulation of our apprenticeship system, to the end that an apprentice must, after serving his time, pass a prescribed examination before being qualified to work at his trade, and having passed a satisfactory examination he shall be given a trade certificate.

Once in operation, builders and architects would require these certificates of workmanship, and the result of this system, we believe, would tend to give the general run of craftsmen a better reputation for good workmanship than they now enjoy, and would attract the most intelligent and desirable boys in the land to take up the mason's trade.

Fourth. — To break down the barriers, real or imaginary, which may now exist between the artisan and architect.

The architect, in the minds of many workmen, is regarded, too often a rather pompous sort of an individual, who can draw a pretty picture of a house, has a good flow of language, and puts on lots of style, although in practice he does not know a cold chisel from a brickset, while on the other hand, many architects consider the journeyman mason, if they think of him at all, as a roving, illiterate and incompetent man, unfit for their confidence or association, and far below them in mental, moral, and social standing. These opinions, on both sides, are generally unjust and untrue.

Schools for the manual training of young men for the various building trades are in successful operation in many of our large cities; schools for the education of young men as architects may also be found throughout the country; both are engaged in a glorious and noble work, but a true philosopher will question whether they are following out their highest ideal or grasping their grandest opportunities, until they shall have united in a common cause and work hand in hand, step by step, until these conditions shall have been ameliorated, which now prevent our craftsmen from rivaling those of Greece or of the Middle Ages. Michael Angelo and Wrenn were the outgrowth of times in which can be seen the beginnings of present conditions. To bring these ideas to a successful realization THE BRICKBUILDER asks for and expects the hearty cooperation of every architect, builder, and workman in the country, who has the best interests of his business at heart, and who would better the condition not only of himself but of his fellow-men.

> The builder's trowel and the settler's ax
> Are seldom wielded by the selfsame hand,
> Ours is the harder task; yet not the less
> Shall we receive the blessing for our toil
> From the choice spirits of the after-time.— *Lowell.*

BOILER SETTING.

SOMETIME in his varied career a mason is sure to be called upon to set a boiler, and the few practical ideas given here may not come amiss.

The foundation of all boilers should be of the firmest character, either of stone or brick, and the best material used throughout.

Less than a 12 in. wall should not be allowed, even in the smallest size of horizontal boilers. Large boilers have 12 ins., 20 ins., and 24 ins. additional to the fire-brick lining of furnace. In setting a boiler, arrangement should be made to carry on combustion with the greatest possible heat. This requires good non-conductors of heat, such as fire-brick, to line the furnace box, and continued over the roof of the boiler. The top of the bridge wall should be of fire-brick and laid as an inverted arch for stability.

The arch over the back connection of boiler should not be turned against the boiler, but should be sprung from the side walls and free one half inch from the boiler. The lugs of a boiler should rest on iron plates, build the wall for the lugs to *give and take* on the rollers; otherwise the expansion of the boiler will crack the wall.

The arch over a boiler should spring from the side walls and be self-supporting, and not turned on the boiler, which should be 1 or 2 ins. from the fire-brick.

Lay strips of wood lengthwise on the boiler and turn the arch on them; when the arch is keyed remove what you can of them; the fire will remove the remainder. Many claim that an air space within a boiler wall is not of any service and the same thickness of brick would be better and the wall stronger.

Deep ash pits are the best, and a second or ash grate will help preserve the grate proper, as there is less refraction of heat from it than there would be from a hard brick bottom. The bars of a furnace should be 18 or 20 ins. below the boiler or crown of the furnace. They should slope downward toward the back part about one half inch to the foot.

There is one object that requires very particular attention, and which must be of a certain size to produce the best effect, and that is the flue leading from the boiler to the chimney, as well as the size and elevation of the chimney itself.

The fire-clay mortar is generally used as follows: one part fire-clay to two parts ground or powdered old brick or refractory sand. The brickwork about the boiler-setting is often imperfectly laid. It is generally done by contract, with no one to supervise it who understands the severe test to which it is to be put. The brick-layer, who may never have worked on a job of this kind before, builds good inside and outside walls, but the space between is apt to be filled up with odds and ends in the most promiscuous manner. Furthermore, he puts the same joint in that he would use if he were building a house, and this is just what we do not want in boiler-setting, particularly in the fire-brick lining of the furnace.

The joints throughout the entire wall should be very thin, and the work should be done as faithfully inside as outside. The fire-clay mortar used in the work should be used as thin as possible; in fact, some mill owners will not let a trowel be used in laying fire-brick, but require the mortar to be so thin as to necessitate the use of large iron spoons. The fire-brick should be dipped in water as they

are used, so that when they are laid they will not immediately soak up all the water in the mortar. One point to be kept in mind constantly is to use as little fire-clay as possible in laying fire-brick under any circumstances.

Every sixth course, beginning with the grates, should be a row of headers *well bonded into the masonry behind.* The headers are of little use unless securely bonded into the main wall, for where the lower courses of fire-brick have burned away more or less, we have to rely on their headers, to a considerable extent, to hold the front of the wall in position.

In repairing fire-brick linings, the lower courses, which burn out fastest, can be removed and replaced without disturbing the upper part of the wall, provided the headers are secure, while, if they are not, the entire wall may have to be rebuilt, and this cannot be done without either removing the boiler or tearing down a considerable part of the setting or back wall. Those who have had considerable experience in repairing boilers claim that headers should not be put in until the lining has been carried up nine courses above the grate.

The setting of a horizontal boiler is a matter that almost any competent mason may accomplish, either for heating purposes or for power, by following these instructions and the examination of the *setting* of a boiler in place.

When upright boilers are enclosed in brickwork for heating purposes the outside is generally built square, to suit the door castings and for appearances; but the inside is generally built *round*, 3 or 4 ins. from the boiler, to make a flue or air space, which will be the same distance from the boiler on every side. If it is necessary to have a flue so constructed, with the outside still square, build two walls, — a round one and a square one, — but the inner one must not touch the outer one, or the latter will crack, in consequence of the contraction and expansion of the inner wall caused by heat.

SUGGESTIONS FROM AN EXPERT.

IN an interview with Mr. William Peck, of the H. Wales Lines Company, Meriden, Conn., an authority on mason construction, we gained the following information:—

Do you favor the first or second setting of cements for mason work?

"That depends," answered Mr. Peck, "upon the work I have in hand. Generally, however, I prefer the second setting. The truth is that masons very seldom use the first or even second setting of cement, but, owing to their ignorance of the action of cement, generally use it in its third setting. Laborers usually mix up a bed full at a time and temper it as it is used, sometimes once, very often twice; thus by the time it gets into the wall it is in its second or third setting.

"For sidewalks or cement floors I prefer the first setting, as it works better and does not become so spongy under the trowel."

What do you consider the best mode of putting down cement floors?

"I think the best manner to do a good job is, first, to have the ground underneath well tamped down and solid; second, to use screeds instead of strips to get the proper thickness of cement; third, to have help enough to keep putting down all the time and not have to wait between batches, thereby causing a break or joint between the settings which is liable to make a crack; fourth, to float the first coat or layer as little as possible, thereby preventing the rising of the sand to the top of the cement, and insuring a good bond between the rough coat and finish."

What is one of the common errors of contractors?

"One great mistake they make is in not keeping their walls properly covered during construction, especially in the winter. A few dollars expended for tar paper or canvas and the time required to cover them will often prevent hundreds of dollars' worth of damage by elements, and will not leave a dark streak there when construction is continued."

CRACKS IN BRICKWORK AND PLASTERING.

WHAT CAUSES THEM AND HOW THEY MAY BE PREVENTED.

BY A. H. DYER.

(*Continued.*)

IN Fig. 10 we have a case similar to that shown by Fig. 8, and an exact representation of the present condition of a certain store front; the opposite corner of this building is in the same condition as the one shown. By the location of the crack extending downward and outward from the window sill, and also crack G below the end of lintel, it would appear that the lintel had a bearing of only about one third the area of the 16 in. pier. Crack G extends entirely through the outside course of brick, but to what further extent could not be determined. It is quite probable, however, that the lintel has a bearing several inches outside of the crack G, and that a slight sagging of the lintel allowed the main part of the pier to be thrust outward as the unequal settlement of the foundation increased, and that this part of the pier again caught the entire load after that part of the pier at the left of crack G had been split off. This would not be likely to occur unless the ends of the lintel were set upon an uneven bed, leaving the extreme ends entirely or nearly free from the pier. The front being 48 ft. wide, the "I" beams, if securely bolted together in the center, and set in extreme hot weather, might possibly contract enough at the right time to slightly aid in causing crack G. Crack H is a very common occurrence, while crack G is not. Crack I usually appears after crack H, and when both of them appear and extend from the opening to the corner of the building they do not by any means increase the value of the building, or its reputation as a safe one. It might be well to add that the building described in Fig. 10 is in a town having no building laws or inspectors, but it is quite unnecessary to say that the foundation was built in the *good old-fashioned way* with just as large an area of footings per lineal foot below line A as below any part of the side walls.

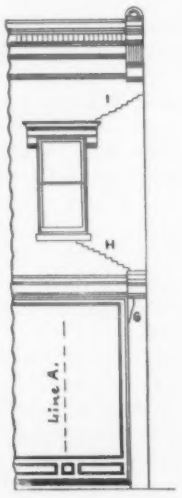


FIG. 10.

Fig. 11 shows a stone door sill broken by continued unequal settlement, and is not an uncommon occurrence. Even if the sill was only bedded at the ends and "pointed up after completion of the brickwork," a bad case of unequal settlement would cause the sill to be broken as shown.

Fig. 12 shows the usual course taken by cracks that occur over a flat arch. It is a noticeable fact that over a segment or a flat arch the cracks usually work toward the center line of the opening, while in semi-circular arches they more frequently work *away* from the center line.

Fig. 13 shows a case that is not very common, and one that will require careful study to understand, but the cause is in the foundation, just the same.

Fig. 14 shows a section and part elevation of the wall of a two-story and basement brick building; width of footings, 32 ins., basement wall, 16 ins., and wall above basement, 12 ins. thick. Now we will proceed to ascertain how many square inches of bottom footings should be omitted below the center of the openings in order that the foundation may have a uniform load per square foot or inch. In order to be more easily understood, as well as to avoid a complication of loads, we will at first assume that this wall is a portion of an end wall of the building and has nothing to support but the weight of the wall itself. First, we will take one lineal foot of the solid wall its entire height (which is 40 ft.), and find the load per square inch. At 112 lbs. per cubic foot, one lineal foot of the solid wall, including footings, will weigh about 4,910 lbs. Directly beneath this lineal

foot of wall we have 384 sq. ins. or footings (12 ins. by 32 ins.); therefore, the load per square inch would be 4,910 lbs. divided by 384 sq. ins., which would be approximately a load of 13 lbs. per square inch. With a box window frame, the increased width of the inside of the opening will take out enough brickwork to offset the weights of the

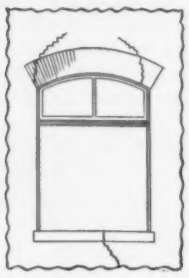


FIG. 11.

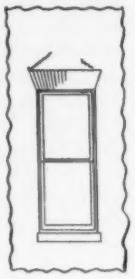


FIG. 12.

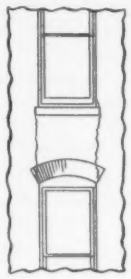


FIG. 13.

frame, sash, weights, etc., so we will figure the openings at the outside measurements as marked on the drawing, and we have a total of 8,101 lbs. that has been omitted by the three openings. Divide this by 13 lbs. per square inch, and we find that 623 sq. ins. must be deducted from the footings in order that they may have a uniform load. Now divide 623 by 32 (the width of footings) and we have approximately 19½ *lin. ins.* of footings more than is required to support the weight above at the rate of 13 lbs. per square inch. This 19½ ins. must be entirely removed from below the center line of the openings as shown, and the result will be practically a uniform load upon each square foot of footings. Now we will assume that Fig. 4 represents a section and part elevation of the *side* wall of a building, and that the weight of the floors, ceiling, roof, etc., that is distributed along the entire length of side wall, amounts to 7 lbs. per square inch added to weight of wall at 13 lbs. per square inch, which would make a total of 20 lbs. per square inch.

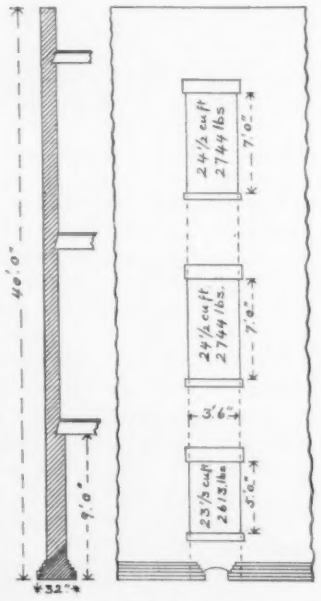


FIG. 14.

We will not go into any unnecessary details in regard to the exact spacing of the joists, etc., but will assume that this extra weight is evenly distributed. By calculating as before, with the exception, that we use 20 instead of 13 lbs. for the load per square inch, we find that the "cut out" in this case would be but 12⅔ ins. wide, instead of 19½ ins.; but, if we wish a perfect foundation it should be cut out just the same. It must be understood, however, that there are cases where the sides of the "cut out" would be too close to the center line of the openings, especially if the bottom opening were a wide one, or if located but a short distance above the footings; in such an event, it would be necessary to *increase* the width of the "cut out," and correspondingly increase the width of the footings at each side of the "cut out," as will be explained later.

When buildings that are built upon a continuous foundation begin to show signs of unequal settlement, as in Figs. 1, 8, 10, 11, or 12, the cracks can usually be prevented from extending any farther, by *relieving the footings*, and can even be "set back," or, in other words, the footings may be cut out so as to cause a *very slight* settlement toward the center of the openings; but in either case, no one but an expert should be allowed to make the attempt, and *he* should carefully consider the following points:—

First, the nature of the ground below the openings, as well as at each side of the openings. Second, the loads per square inch. Third, the starting point of the cracks, also the direction they seem inclined to follow. Fourth, the age of the building, and the manner of its construction.

Many a building might be saved from a bad reputation and consequent decreased valuation, if at the proper time the proper person was consulted and given the entire charge of the work. The right man *at the right time*, and with nothing but a plumb-rule, a piece of chalk, a pinch-bar, and a fair knowledge of mathematics, added to long, practical experience and good judgment, could, in a short time, prevent a great deal of trouble, and that, too, in a quiet way without attracting attention, and in most cases at comparatively little or no expense, except for *knowing how*, and in consideration of the benefits to be derived from a successful operation the latter item should not be too grudgingly considered, as *experiments* might prove to be still more expensive.

(*To be continued.*)

THE SUCCESSFUL BUILDER.

ONE can usually distinguish the successful builder by his pronounced characteristics; he possesses that firm, self-reliant appearance which denotes grit, patience, and energy, and stamps him at once as a person not easily discouraged or depressed. He is one of those individuals who seems to have the power to size you up at a glance,—a ready reader of human nature. You observe in all his actions the predominating elements of caution and conservativeness. We often find him a man possessing a somewhat limited education outside of his particular line; his opportunities of securing an elaborate education were necessarily very limited, as he probably took up his trade at the tender age of fifteen or sixteen years. But in the lesson of life he has proved an apt and diligent scholar, and through this training he has discovered, as pertaining to his calling, the fundamental principles of success; his brain is a storehouse of practical knowledge, and his men are the tools by which he puts this knowledge into practical execution.

Again, we often find him a man whom the world calls stubborn, very set in his ideas and opinions. He is generally a hard worker, and, if he be permanently successful, a natural financier. You might ask why these numerous qualifications are so potent a factor to the builder's ultimate success. Why must he be possessed of grit, patience, energy?

There is probably no business, trade, or calling which is at times so annoying, so discouraging, so disagreeable as that of a builder, and to overcome the difficulties which are bound to beset him under these conditions and circumstances it requires the exercise of all these qualities to the highest degree.

A single mistake or error in judgment, be it ever so trifling, may and often does result in the loss of hundreds of dollars. We must admit that mistakes will occur even under the best of management; but, once made, the builder or his superintendent must not proclaim their error to the public, or even to the workmen employed on the building, but must set to work at once to rectify it. As a reader of human nature he is often an expert; years of contact with his fellow-men in every class have developed this element in his character to a high degree. He must be able to judge of a man's ability at sight, and often at a glance he is able to discern their good or bad qualities, as the case may be.

Touching his education, we have reached, perhaps, and we say it with all due respect, one of the weakest points in his armament. How often, in the varied career of almost every builder, has he felt the need of a better education, especially in those branches which his business requires a thorough knowledge of.

With the assistance of such an education he could much more

easily meet and overcome the problem of his calling and lighten those tedious hours of labor studying out plans and estimating on their execution, work far more irksome to him than working on the wall.

Ten or fifteen years ago the chances of securing the necessary education were slim, indeed, but to-day, with the facilities which are placed at his command at a comparatively small cost, and with the constant cry being for better trained men, is it not the duty of every up-to-date, practical man to avail himself of every opportunity, and thus advance himself and his craft?

One of the essentials in acquiring a better education is to follow current literature which has a direct bearing on one's business. To this end the better class of trade journals devote their entire energies, and it is beyond question that the artisan or tradesman who closely follows that particular journal which is devoted to the interests of his business is better fitted to successfully meet the problems which will arise so frequently and persistently.

In this connection, we would state that it is the purpose of THE BRICKBUILDER, through its Masons' Department, to meet just these requirements of the *coming* contractor.

In our efforts to place at his disposal that class of matter which shall be of the greatest benefit to him as a means of better education, and to bring him into closer touch with the higher ideals of his work, we ask of him cooperation and support.

HEADERS ALONG THE LINE.

BRICKLAYERS are in demand throughout Connecticut, and the outlook is for steady work for several weeks.

MASONS should take great care in laying terra-cotta blocks or ornaments; otherwise the long lines of a building, such as the string-courses or cornices, which are intended to be straight, are apt to be uneven, and the faces of blocks often winding.

THE latest building accident is the collapse of the Coliseum Building, Chicago. This vast hall was to cover five acres of ground and seat 16,000 people. Better by far it should fall now than when filled with human lives. Now the question is, Where does the blame lie?

THE propriety of using mortar joints as thin as possible in brick-work is urged by the best authorities. In Roman and most Eastern work the joints in some instances were 1 and 1½ ins. thick, and when the mortar has been good such buildings, after centuries of wear, have been found sound and good but we have no such faith in mortar made in modern times. Mr. Rawlinson says, "As a general rule, buildings, whether of marble, limestone, sandstone, or of brick-work alone, or of brick and terra-cotta combined, which are ornamental in character, must all have *thin* joints. Thick beds and joints of mortar would destroy the harmony of design by deteriorating the appearance of labor bestowed on the rich material in such buildings."

AMERICAN workmen engaged in building construction are inclined to think, in view of the recent disastrous collapse of several large structures in course of construction in this country, that their position is far more hazardous than that of their foreign brethren engaged in similar occupation. We find, however, that this idea is entirely erroneous, as will be seen by the following reports sent to this country.

Three weeks ago a building in process of construction in Guben, a city of Brandenburg, collapsed, burying sixteen workmen in the ruins. Nine of the men were instantly killed, and the others severely injured. Again, about a week later, a spinning factory at Bocholt, in Westphalia, fell down, burying forty men, ten of whom were killed outright, while nine more were seriously injured.

A NUMBER of architects who are in sympathy with THE BRICKBUILDER'S efforts to bring the mason into closer touch with the architect will contribute to this department during the coming year.

LEGAL POINTERS.

CONSTRUCTION OF BUILDING CONTRACT AS TO ALTERATIONS. — A contract provided that the builder should forfeit ten dollars for each day that the building remained unfinished after the time fixed by the agreement for its completion. It also provided that any change in the plans, "either in quantity or quality of the work," should be executed by the builder, "without holding the contract as violated or void in any other respect." During the progress of the work a change was made in the material for the front of the building, from brick and granite to Indiana stone, with carved panels and frieze. The difficulty in procuring a prompt delivery of the stone caused delay in finishing the building, and the owners claimed to recoup the stipulated forfeit and set off the loss of rents. By the agreement the owners reserved the right at any time during the progress of the work to make any alterations in the plans and specifications, and it became the duty of the builder to carry them into effect. The provision that the changed plans should be executed without holding the contract as violated or void in any other respect should be read in connection with this reserved right. The words "in any other respect" exclude the implication of any change in terms except such as would result from the alteration of the plans, but not such changes as would be the necessary consequence thereof. Alterations calling for more work and materials might, of necessity, require more time for the completion of the building. They might be directed so near the end of the work as to make it impossible to complete the building within the time stipulated. In this case the building was located where the material fixed for the front by the contract could be purchased in an open market and delivered ready for use in one day. The stone required by the alteration could be procured only at the quarries in Indiana, where an order had to await its turn; and, after delivery, it required weeks of skilled labor to fit it for use in the building. For such delay in the completion of the building as was the necessary consequence of the change of plans by the owners the builder was not answerable, and for it no forfeiture could be exacted. —*Supreme Court of Pennsylvania.*

WHAT IS NOT A PARTY WALL. — Where one, intending to construct a wall for his building within the line of his lot, by mistake extends the foundations slightly onto an adjoining lot, the wall does not for that reason become a party wall.

The party constructing a wall so that it projects for an inch and a fraction onto an adjoining lot may be compelled to remove it, so that it shall not encroach. Parties have no right either in law or in equity to occupy land that does not belong to them. — *Supreme Court of Pennsylvania.*

BREACH OF BUILDING RESTRICTIONS. — A roofed porch, built on brick foundations, and permanently attached to the whole front width of a house, though unenclosed, is within the prohibition of a building restriction in a deed that all buildings shall be erected not less than a certain number of feet back from the fence line.—*Supreme Court of Pennsylvania.*

RELEASE AND DISCHARGE. JOINT CONTRACTORS. — Where a person who is liable to two or more on a joint contract settles with one of them for a part of the claim, such settlement does not discharge him from the liability to the others, but they may sue for their part without joining the one settled with. — *Supreme Court of New York.*

THE Supreme Court of Pennsylvania holds that the owner of a building cannot complain of an instruction in an action to enforce a mechanic's lien restricting a material man's recovery to the value of the materials furnished by him on the credit of the buildings, and actually used in their construction.

DAMAGES FOR DELAY.— Where a contractor fails to complete a building, and the owners take possession and do so, the measure of damages will be the amount of the unpaid contract price, less the fair and reasonable amount the owners had to pay to complete the work.

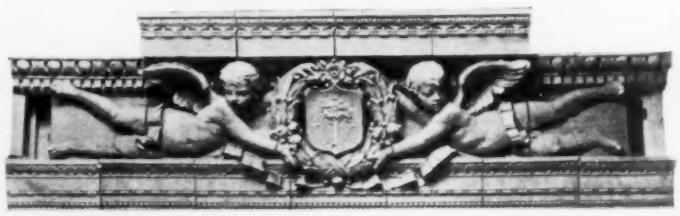
Recent Brick and Terra-Cotta Work in American Cities.

A Department Devoted to the Interests of the Manufacturer.

PHILADELPHIA.—"Unless all signs fail," Philadelphia will, within the next few years, witness the erection within its borders of several buildings which will be handed down to posterity, buildings which will be erected to last for centuries, and to show to future generations the achievements of the present in art, architecture, etc. We refer to the buildings now in preparation for the Archæological Society of the University of Pennsylvania and the Art Museum about to be erected in Fairmount Park by the park commissioners of the city of Philadelphia.

The former project has lately assumed definite shape and will be pushed to completion as soon as a small grant of property is made by the city council to the Archæological Society, in order to enlarge the now irregular plot to the dimensions required for the proposed building; this grant, it is understood, will be made at once, so that the work upon the western section can be commenced.

The building, when completed, will be 700 ft. long and 525 ft. deep. It will consist of a large central pavilion, surmounted by a dome, and flanked on either side by a smaller pavilion and dome; from this central pavilion six arcaded passages lead to the buildings set apart for the different departments represented in the society; there will be in all nineteen pavilions, all connected to each other, and to the central portion by the arcades, and all facing upon the large, open gardens which will surround the entire building; the buildings will all be terraced to the central pavilion, which will be about 12 ft. higher than those fronting the grade of the streets, and will enhance very much the artistic and monumental features of the scheme.



The material for the entire buildings will be brick; wherever it is possible to use bricks they will be preferred to other materials; very little terra-cotta will consequently be required, and this only where bricks will not fully meet the requirements; the kind and color of the bricks has not, as yet, been determined, but will be in the near future; the cost will be about $1,500,000, and the part of the scheme which will be pushed to completion in advance will, it is estimated, cost about $300,000.

Architecturally, the project could not have been put into better hands. Messrs. Cope & Stewardson, Frank Miles Day & Bro., and Wilson Eyre, Jr., have been associated upon the work; and any one familiar with their work knows that, with such a combination of the best talent in the city, the artistic as well as the architectural features of the building will be well rendered throughout.

Several sketches, principally of the massing of the different parts of the work, have been made and some published in the daily papers, but, as the scheme is still being studied and changes being daily made to it, we refrain from publishing any of the sketches until the entire scheme is completed.

Architectural interests are at the present time centered upon the competition for the Art Museum for Fairmount Park, which closed on the first of this month; probably there were no more surprised persons to be found than the commissioners themselves when they saw being delivered to them 111 designs and some alternatives (one architect, we believe, sent in nine different schemes), mostly mounted on stretchers of such immense size that there was no place to put them, and some of which would not go through the door into the room where they were to be temporarily stored. They did the best thing they could, sent them out to the park and placed them in Memorial Hall, where they will probably remain until finally judged.

The designs come from most of the largest cities of the United States, some from Canada, and one from Paris. Nearly every large city is represented by one or more designs, and it is probable that, although the terms of the competition were very vague and unsatisfactory, much real good work from some of the best architects in the country has been submitted.

The commission having the matter in charge held a meeting at the Memorial Hall recently, and the subject of having expert and professional judges pass upon the merits of the designs was freely discussed; a resolution was passed, which will soon be submitted to the park commissioners for ratification. It provides for a committee of experts as follows: —

"The provost of the University of Pennsylvania.

"One person selected by the directors of the Academy of Fine Arts.

"Three disinterested architects.

"Two expert builders, not architects, chosen by the Memorial Hall committee.

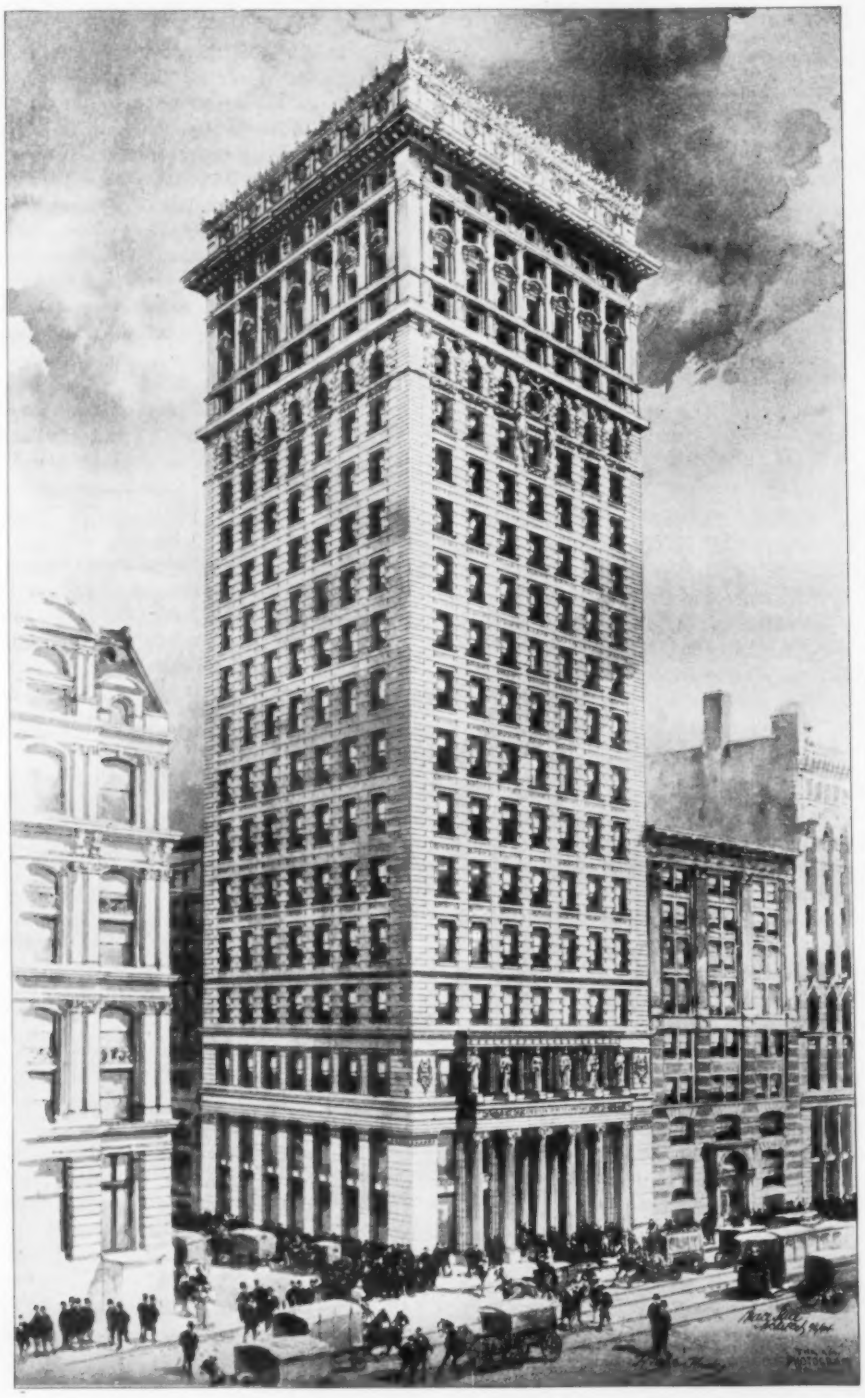
"They shall meet and examine the designs, and report on or before Nov. 30, 1895, for the determination of the board of park commissioners. Eight of the designs entitled in their judgment to be candidates for the prizes offered."

The result of the deliberations of the judges will be awaited with considerable eagerness by the entire profession. It seems not improbable that the result of this poorly regulated competition will be more satisfactory than those in some of our neighboring cities, which were supposed to be conducted upon a more favorable basis, so far as the profession is concerned.

THE accompanying illustrations are of terra-cotta details for the new Horticultural Hall and several fine residences now being erected in this city. The details have been finely executed by the Conkling-Armstrong Terra-Cotta Company.

THE Chisholm, Boyd & White Co. makers of the well-known Boyd Brick Presses, have removed their general offices from 324 Dearborn Street to the company's works, Fifty-Seventh and Wallace Streets, Chicago. Like many other large corporations with extensive plants, they have found it desirable to concentrate their entire executive force under one roof.

CHICAGO.— One of the outgrowths of labor unions is the attempt on the part of contractors to limit the number of recruits to their ranks. Perhaps it would be better to say that their object is to keep out unworthy men, — an object which physicians and lawyers attain by means of state licenses, — a means which, by the way, ought to be in the hands of the architectural profession, as well. In the case of a contractors' association they can scarcely be blamed for using their relations with labor unions to keep men from working for a contractor who is not one of their number, if through such means (by stopping the operations of a would-be contractor who lacks skill in his work or honor in his dealings) they can prevent a lowering of standards of workmanship and prices. But anything beyond that is certainly subversive to the rights of free citizenship. The Masons' and Builders' Association, of Chicago, is exciting a little talk in this connection. A certain gentleman, who had a large general contract on hand at the time, was invited to join the association. He responded by putting in his application, and then was blackballed. It is reported that then a decree was issued that he would be allowed to finish his existing contract, but that he must enter into no others. At any rate, whether such warning was given or not, the gentleman, who has high qualifications for his business, considered it wise to make the best possible preparations for a legal fight for his rights. Centralization of power, either in the case of capital or labor, brings dangerous temptations.



AMERICAN SURETY COMPANY BUILDING, PINE STREET AND BROADWAY, NEW YORK.

Bruce Price, Architect; C. T. Wills, Builder; twenty stories high; foundation, 72 ft. below curb; height of building, 306 ft. above curb; frontage, 84 ft. 8 ins. on Broadway, 85 ft. 6 ins. on Pine Street. Brick furnished by Sayre & Fisher Company.

Another high office building is on the boards, but full announcement of it cannot be made as yet.

Apartment buildings costing from $5,000 to $75,000 each continue to astonish by their numbers. One costing $200,000 for Mr. O. E. Weber, E. H. Turnock, architect, is to be built on Prairie Avenue, in a neighborhood of fine residences. It is to be fire-proof, tile floor and steel beam construction, and cast columns (alas! that steel scarcity should crowd out rolled columns in favor of more easily obtained cast iron). The plan arranges to have teams drive directly into the basement, whence supplies are carried by elevators to the sixty-four different suites.

The *Economist* announces a project to build on North Clark Street an elaborate ten-story apartment building, fronting 300 to 400 ft. on each of two streets. This is still a scheme.

In the way of manufacturing buildings some large new bicycle factories as well as additions to old ones are being built.

The courts and other tenants of the old Federal Building are preparing to find quarters in various office buildings. The post-office cannot move into the temporary building at the expected date. The time limit (ten weeks) is about up for the completion of the temporary post-office, which will be a very neat, common brick and wood construction building, with wood grillage foundations. From present appearances, the $100 per day penalty for delay will have a chance to pile up considerably.

The announcement that Mr. Chas. A. Coolidge is likely to be

appointed architect for the new permanent Government Building certainly brought sighs of relief to Chicago architects, who feared that the work would fall into worse hands. The only objection made to Mr. Coolidge worth noting is that he has not lived here long enough to be a real Chicagoan.

The local chapter of the A. I. A. has elected new officers as follows: President, George Beaumont; Treasurer, L. G. Hallberg; Secretary, Dwight H. Perkins.

The American Terra-cotta Co. has the contract for the terra-cotta for the new Davies office building (Jenney & Mundie, architects.) This is one of the buildings where, to avoid delay, cast iron instead of steel columns will be used.

DETROIT. There is no change of note in the general business situation, and the conviction is steadily gaining ground among dealers that the present fall will see a decidedly lively market.

The volume of trade is equal to that of last year, and in some important branches is larger than that of any other year.

The real estate transactions which benefit the builders at large are sales of vacant lots for improvements, and in this respect Detroit can make as good a showing as any city of its magnitude in America.

Members of the site committee of the board of supervisors now favor purchasing the Henkel site property at a cost of $500,000 for the new county building. The committee met last week with the county auditors to discuss the question of who should have charge of the erection of the county building, and it was at this meeting that Mr. Baker gave the opinion that it would be advisable to offer prizes for building plans, as follows: First prize, to use plans for building; second prize, $1,500; third prize, $1,000; also that $500 be divided among the remaining plans of merit.

MANTEL EXECUTED IN FAIENCE BY THE ATWOOD FAIENCE COMPANY.

A number of Eastern capitalists have had agents in Detroit the past week looking over the city with a view of making investments. They have finally decided that the best investment at present is in office buildings, and a number of deals are on that will lead to the erection of some more mammoth sky-scrapers.

Arrangements are on foot for very important improvements on Virginia Avenue, which will make that thoroughfare one of the most attractive in the city. The avenue has already been paved with brick from Woodward to Second Avenue, and fine residences of brick, costing from $10,000 to $15,000 each, are to be erected for Lincoln Abraham, Alexander H. McDonald, Rev. W. Warne, and three by Tuller & Van Husan.

Geo. F. Case, proprietor of the livery stables recently destroyed by fire, will rebuild. Plans are now being prepared by his son. Building will be 50 by 100 ft., five stories high, and be of fire-proof construction; cost, $25,000.

Architect William S. Joy has prepared plans for a handsome apartment building for W. T. McGraw to be erected opposite Ferry Park. It will be constructed of pressed brick with stone trimmings, $21,300.

John Scott & Co. have prepared plans for a fine residence for Alfred E. Bonsfield. It will cost about $20,000; proposals are now being received for its erection.

Another flat is being erected by Frank D. Hovey, on Selden Avenue. It will be of brownstone and buff pressed brick, six stories in height, and will cost $62,000.

Charles Bath will build a block of residences, 104 by 54 ft., constructed of brick and costing $50,000.

There are also a number of manufactories about to be built in Detroit, most of which will be constructed of brick.

Architects Malcomson & Higgenbotham are preparing plans for a school-house, 85 by 125 ft., and containing twelve rooms. It will be built of buff brick.

ROCHESTER.—Building has improved but little, if any, since last month. What work is now on is mostly such as the architects do not care to announce. Many of the architects have designs out for buildings which will go on next spring, but very few have anything which will be built this fall.

Messrs. Kelly & Headey have let contracts to White & Coughlin for the erection of a church at Ovid. New York Hydraulic-Press Brick throughout.

Mr. Geo. T. Otis is having plans figured for the First Presbyterian Church at Mendon. New York Hydraulic-Press Brick will probably be used.

Messrs. Fay & Dryer are preparing plans for a large residence; pressed brick and all improvements.

MINNEAPOLIS.—Building operations continue with us on a rather extensive scale and bid fair to continue until winter sets in.

The architects, generally, are not busy as they would like to be, as most of the work is of a small character requiring nothing special in design. This has been a "banner" year in the building of homes, the number of these being highly gratifying, as indicative of the general desire to build and own, instead of renting houses. It promises well for our future.

There is a noticeable hesitancy about beginning building enterprises that will take several months to complete. We have good cause to believe that next spring will find us as busy, generally, as we could wish.

We have had two large fires during September, Westminster Church being completely ruined beyond repair, and the Chamber of Commerce being unroofed and considerably damaged internally. Both of these fires have been traced to electric wires, showing the great necessity of care and frequent inspection of these dangerous methods of lighting. The church will probably be rebuilt in another location, as soon as insurance is adjusted, the present location being extremely valuable for business purposes. It is also possible that the "Chamber" will be rebuilt on a larger scale, as the present building has always been too small to accommodate the principal grain market in the Northwest.

These two buildings will give a great deal of employment during the winter and spring.

Among the buildings contracted for and under way may be mentioned: —

Astronomical observatory for State university, 22 by 40 ft., built of local brick and stone. C. R. Aldrich, architect. Cost, $10,000.

Drill hall and gymnasium for university, 128 by 244 ft., three stories, pressed brick and stone, slate roof, seating 4,000. Cost, $75,000; same architect.

Business block 50 by 100 ft., four stories and basement, for Mrs. Geo. Hale. McMullen Brick Co.'s pressed brick, with brownstone trimmings. Cost, $25,000.

Two-story warehouse, 117 by 130 ft., for Josiah Thompson; pressed-brick facings. Cost, $20,000. Wm. Channing Whitney, architect.

Baptist Church at Vandalia, Ill., 60 by 100 ft., pressed brick, stone trimmings. Cost, $10,000. Architect, Warren H. Hayes.

Double flat building, 78 by 106 ft., three stories and basement, twelve apartments complete, red pressed-brick facing. Cost, $40,000. Wm. S. Hunt, architect.

MESSRS. EVENS & HOWARD have made a departure from the ordinary building methods in the construction of their city offices, 920 Market Street, St. Louis, illustrated in the accompanying cut.

This company has long been engaged in the manufacture of retorts and other apparatus requiring the use of fire-clay slabs and other shapes of large size which, in burning, receive every conceivable shade of color ranging from a bright shade of yellow through reds and browns to blue and black.

Hence, when Architects Eames and Young were called upon to design this building, it was a natural suggestion that if large and solid pieces of clay could be successfully burned as was proved by the material lying in heaps in the company's yards, there was no good reason why the sill courses, lintels, and other trimmings of the building could not be manufactured in the same manner. Therefore, in designing this building, a Romanesque motif was decided upon as best calculated to display the characteristics of this new material and afford a better opportunity for the production of color effects in the wall surfaces.

OFFICE OF EVENS & HOWARD BRICK COMPANY, ST. LOUIS, MO.

No stone has been used, but all parts of the building, except floors and necessary metal work, are burned clay blocks in various forms.

The plain wall surfaces are of Roman brick, and the trimming entirely of this material, which differs from ordinary terra-cotta in that the various members are burned solid; becoming dense and hard as stone, impervious to water, and not subject to injury from the action of frost or fire.

No color drawing can adequately portray the richness and variety of tint which this material takes on, and while the effect of the present building is injured somewhat in its being surrounded by high and dingy walls of common brick, and is on a business thoroughfare, it requires but little of the artistic sense to imagine the charming possibilities of its use, when possible to take advantage of the contrasting colors of trees and climbing vines.

With none of the precise sharpness of stone, it has an advantage over it which makes it particularly valuable for country house work. It requires but a glance to convince any architect endowed with the color sense that it is a most welcome addition to our somewhat limited list of artistic building materials.

TERRA-COTTA DETAIL USED IN GERKEN BUILDING, NEW YORK CITY.

Furnished by Meeker & Carter, agents for the Staten Island Terra-Cotta Company.

THE superior quality of the roofing tiles made by the Celadon Terra-Cotta Company, Charles T. Harris, Lessee, is finding deserved recognition at the hands of many of our leading architects. Contracts to supply these tiles have recently been closed for the following prominent buildings: Robert Goelet's Hotel Walton, Angus S. Wade, architect, Philadelphia, Pa.; Chicago & Alton Station, Springfield, Ill., S. S. Beeman, architect; Third Presbyterian Church, Chester, Pa., Isaac Pursell, architect; Trinity Memorial Church, Binghamton, N. Y., Lacy & Bartoo, architects.

PERHAPS there is no more insidious menace to health than the poisonous fumes of sewer gas. These are the more dangerous because the greater part of them are not detectable by odor, and too often their malignant presence becomes known only through their harmful effects upon the health of those brought in contact with them.

As this has become better understood by the architects there has been a great effort on their part to encourage the general use of sanitary plumbing and by means of traps and water seals prevent the escape of these obnoxious gases into the living-rooms, giving them vent by disposing of them by proper ventilation into the chimney or the open air at the building top where they cease to endanger the general health.

In this connection Henry Hussey & Co., Boston, Mass., wish to call attention to their Eureka Trap, which they guarantee to be a perfect water seal, and, yet, which is most accessible for the purpose of cleaning out. This trap is of handsome design and is meeting with deserved popularity wherever attention has been called to it. We feel justified in the indorsement of any article of merit that pertains to sanitary improvement.

In the handsome new residence of Dr. William Power Wilson on Bay State Road, Boston, Mass., a very happy effect has been produced by the use of gray Roman brick with molded brick trimmings.

The house is a four-story elevation, designed by Mr. J. Ph. Rinn. The bricks were made by Evens & Howard, St. Louis, Mo., and were furnished by Mr. O. W. Peterson, Boston, Mass.

The Fawcett Ventilated Fire-proof Building Company have removed their offices from 104 South Twelfth Street and are now qaurtered in a fine suite in the Philadelphia Bourse.

Messrs. Fiske, Homes & Co., Boston, are the New England agents for the splendid brick made by B. Kreischer & Sons, of New York. Large panels of these bricks laid up in pattern may be seen at their office in the Builders' Exchange Building.

The Powhatan Clay Manufacturing Company have recently taken orders to furnish their famous white bricks for two large buildings in New York City and one in the West.

We would call the attention of manufacturers to the illustration on page xxviii of the new Power Repress for Plastic Brick made by Chambers Bros. Company, Philadelphia.

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New York Agents, Pfotenhauer & Nesbit, Metropolitan Building, New York City.

ARCHITECTURAL INSTRUCTION.

Academy of Architecture, 840 So. Eighth St., St. Louis ii
Correspondence School of Architecture, Scranton, Pa. xxvii

ARCHITECTURAL TERRA-COTTA.

American Terra-Cotta and Ceramic Company, 605 Manhattan Bldg., Chicago, Ill. iv
Conkling-Armstrong Terra-Cotta Company, Builders' Exchange, Philadelphia . xv
Excelsior Terra-Cotta Company, 105 East 22d St., New York City . . . vii
New England Agent, Charles Bacon, 3 Hamilton Place, Boston.
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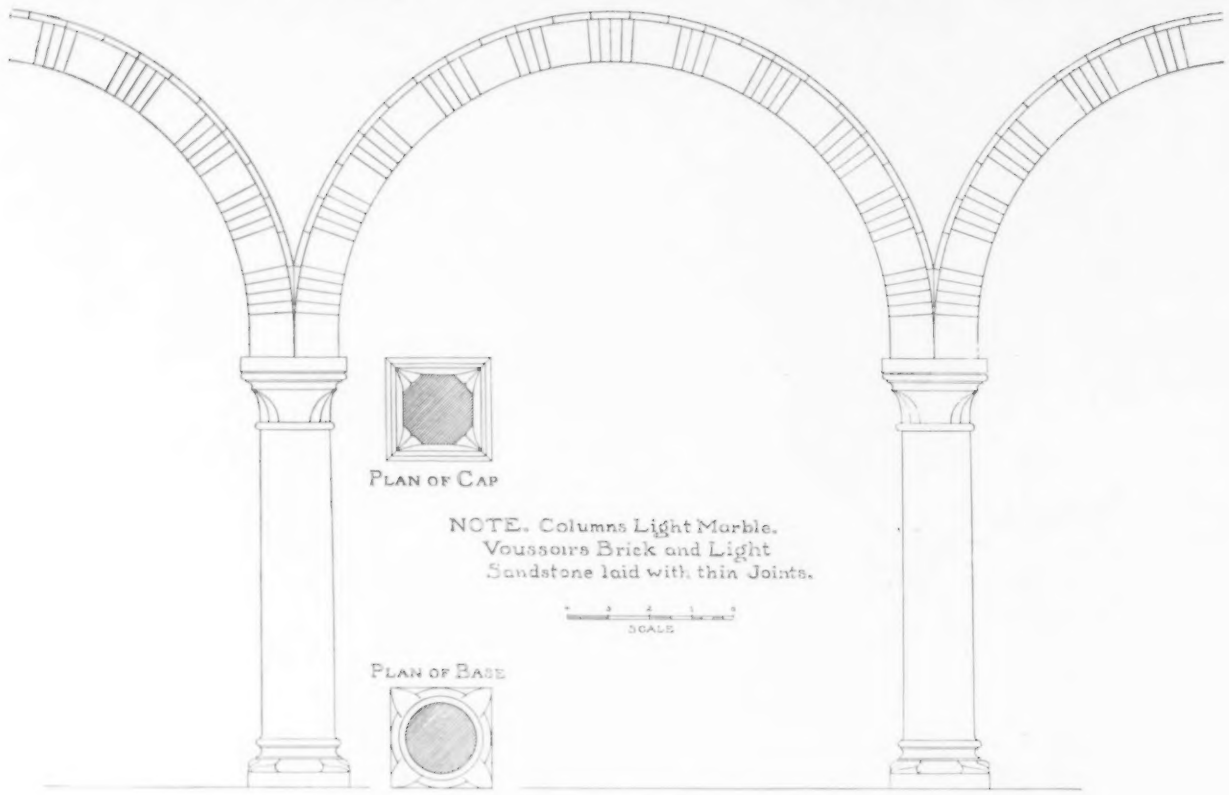
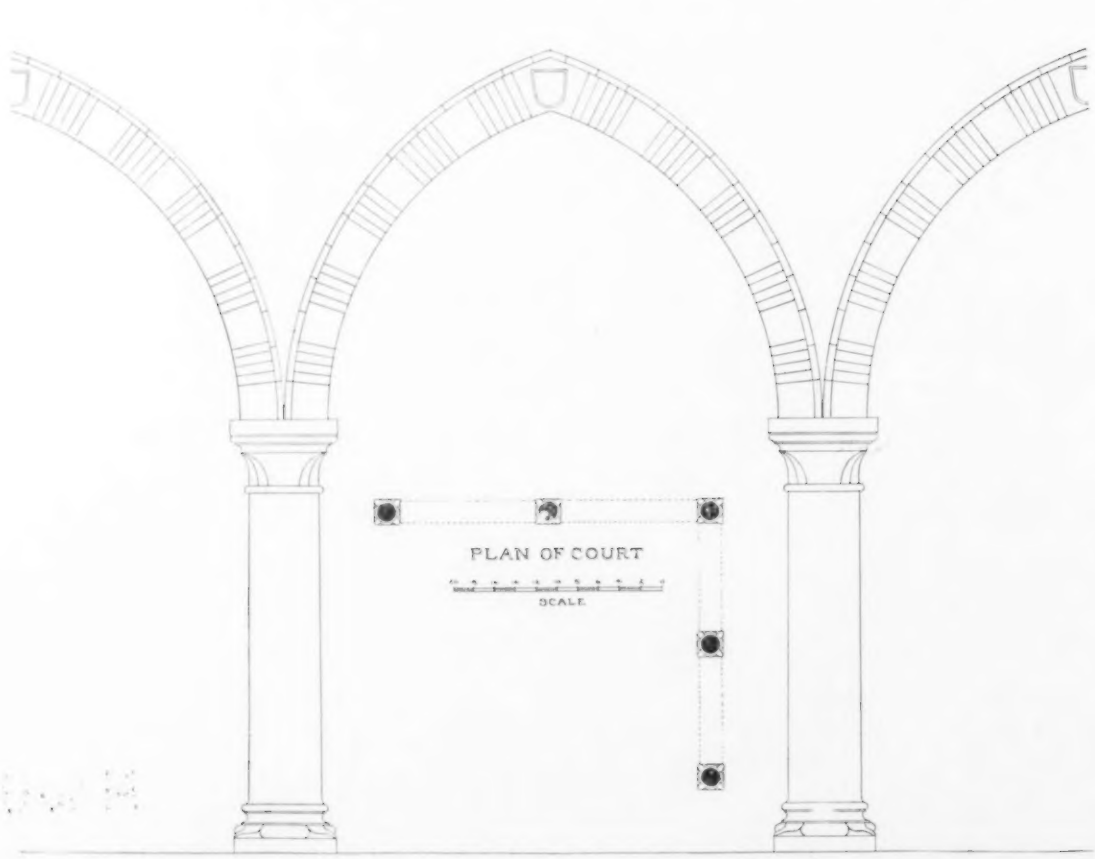
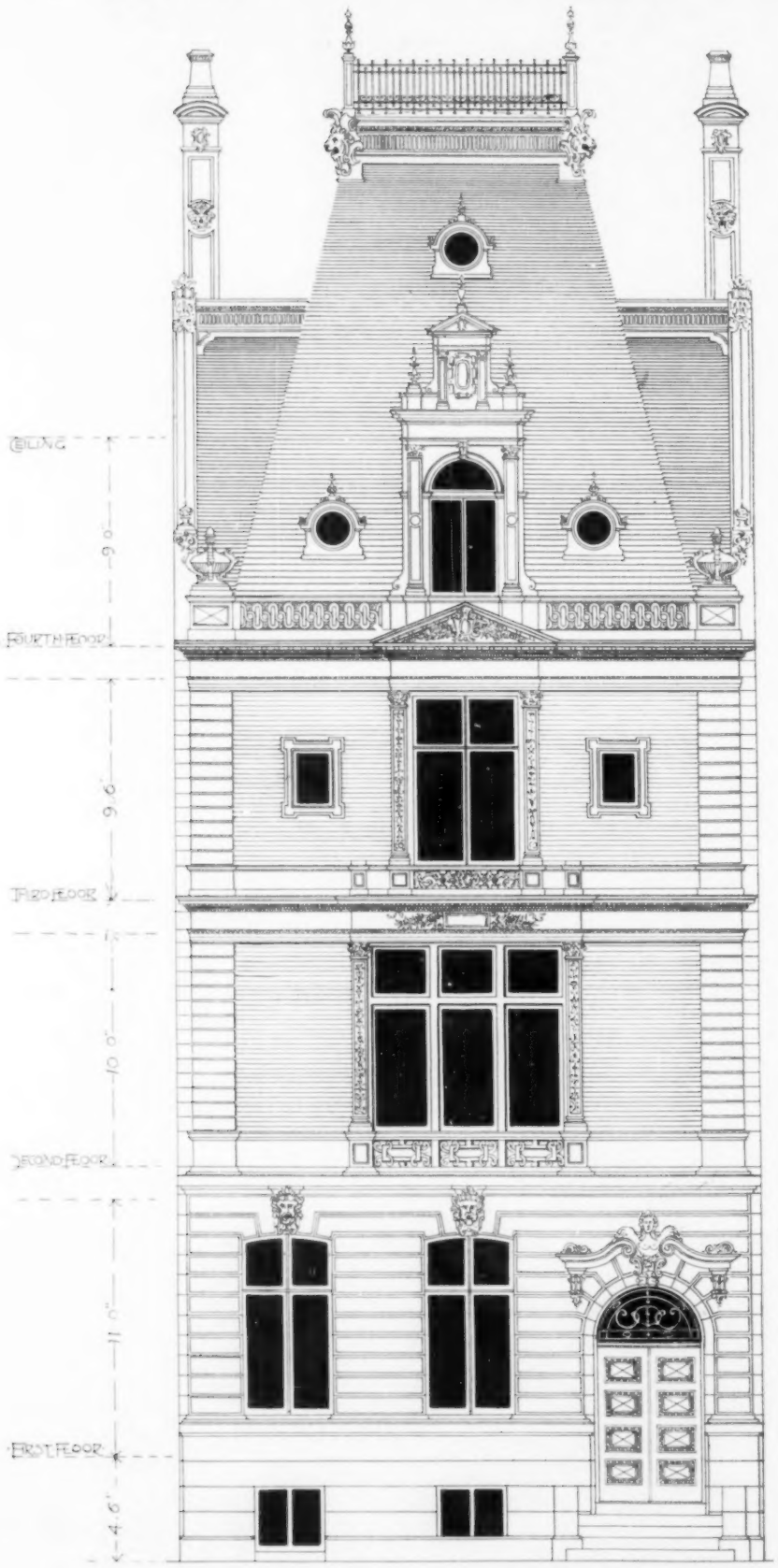
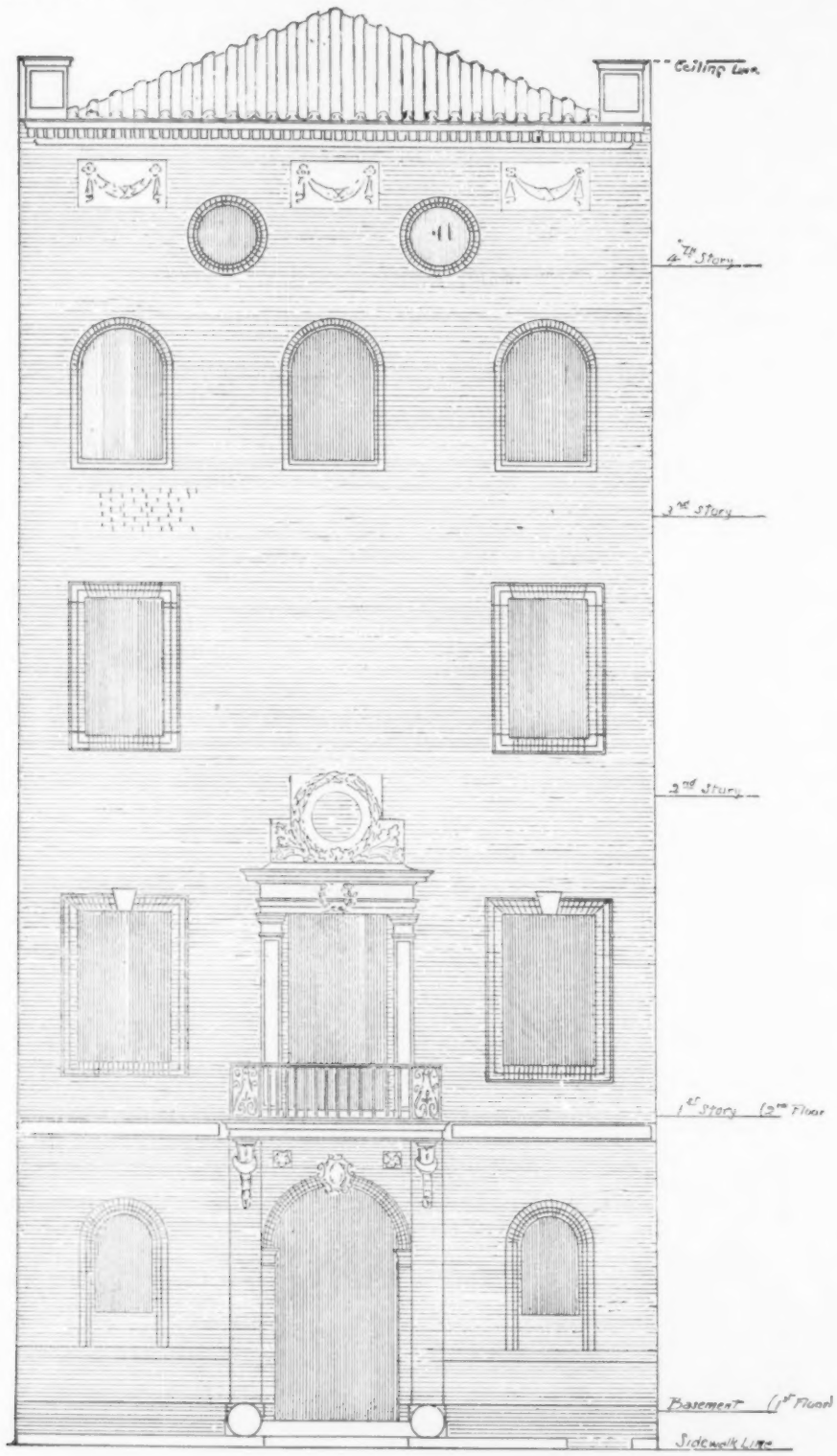




MEASURED DRAWING OF ARCADE IN COURT OF HOUSE ON VIA ARCHE. ACALIGERE. VERONA.



DESIGN SUBMITTED IN THE BRICKBUILDER COMPETITION FOR A CITY HOUSE.



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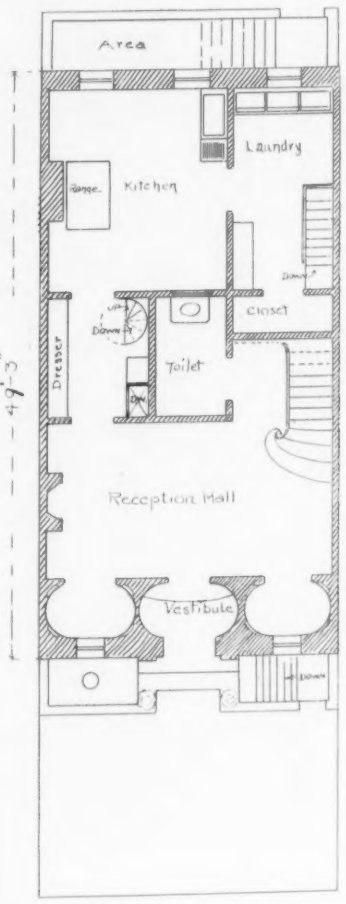
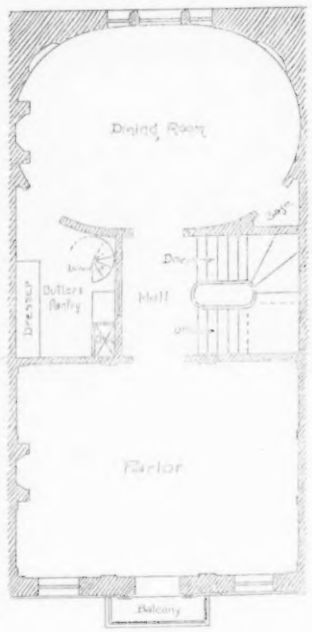
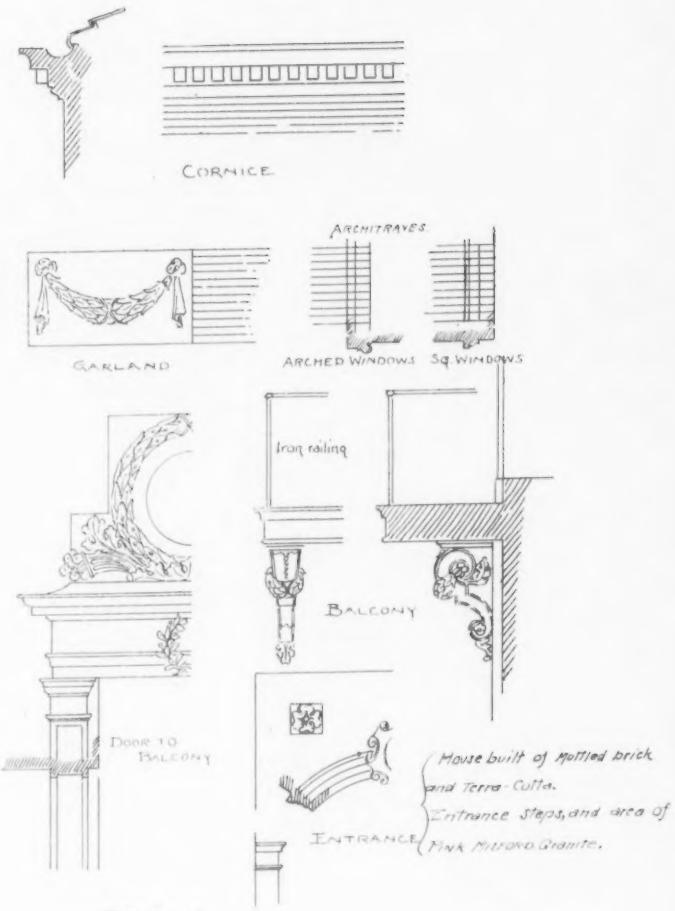


First Floor Plan



Second Floor Plan



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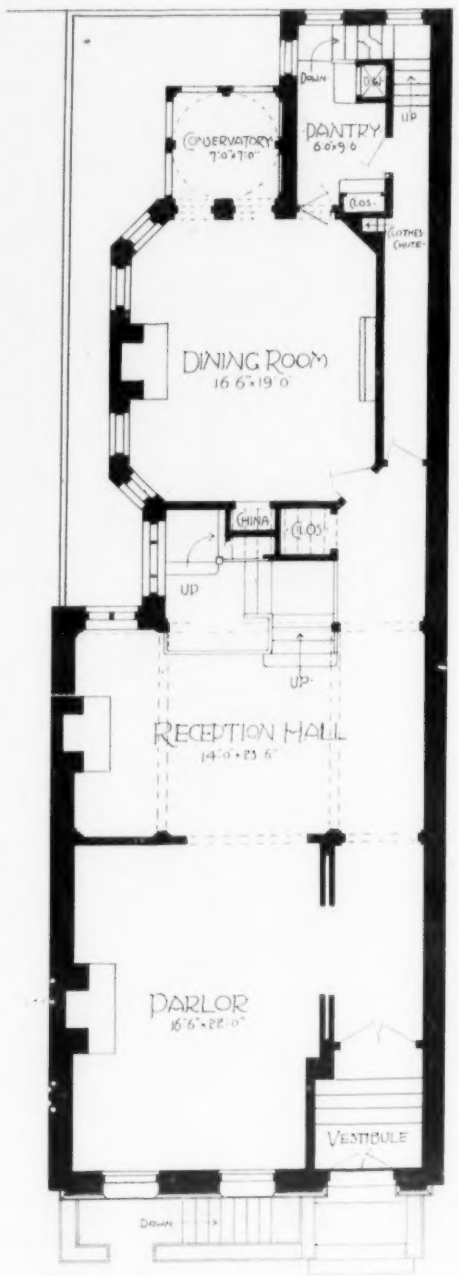

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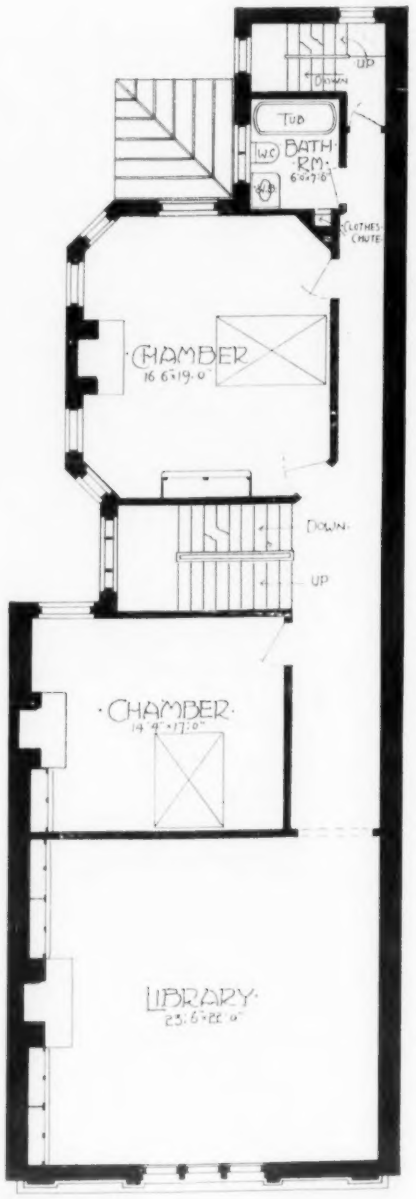

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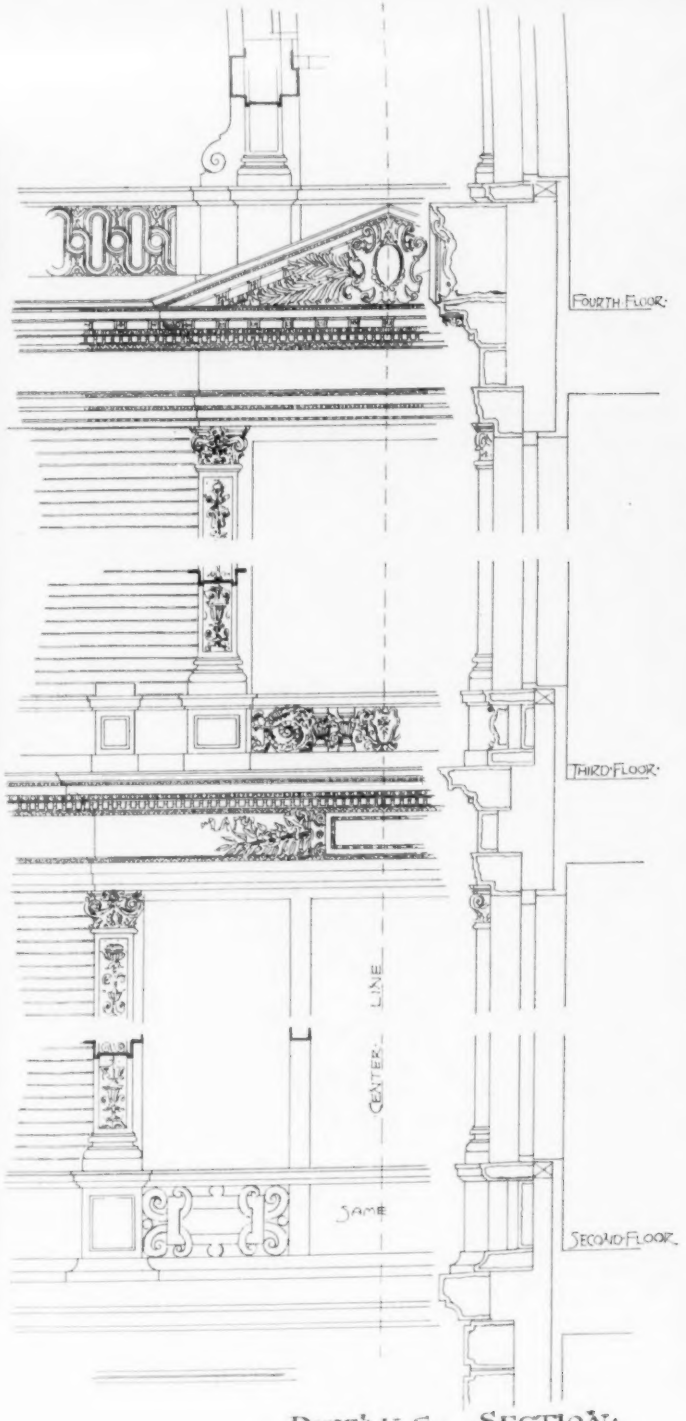

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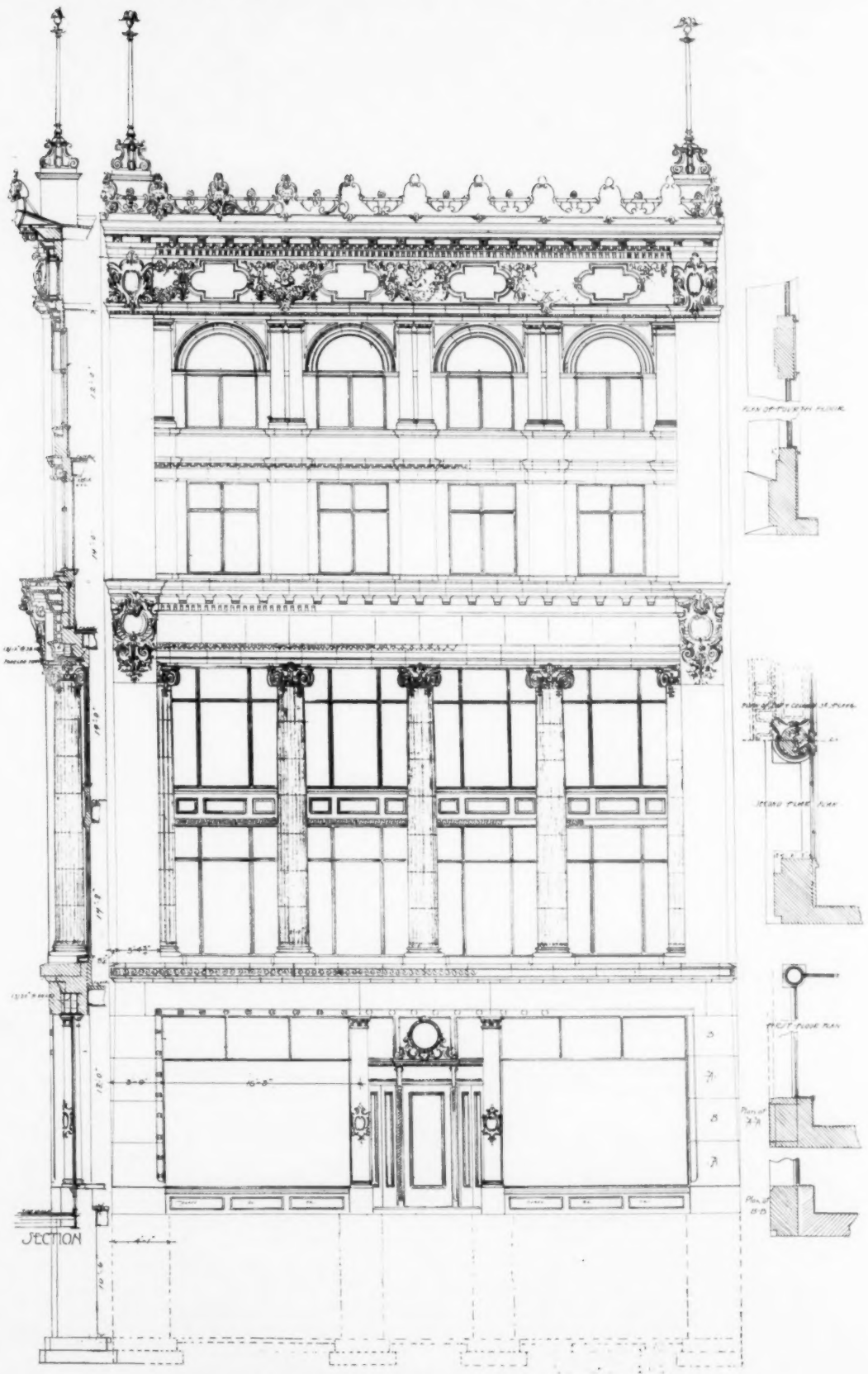

FRONT ELEVATION, CHAPIN BUILDING, BUFFALO, N. Y.

E. A. KENT, ARCHITECT.